

# SOUTHERN POWER AND INDUSTRY

Ad Index, page 122

NOVEMBER, 1954

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### **Big Scale Demineralization**

40 million pounds of water per day at Gulf States Utilities. 100% makeup to 1,500 psi boilers in Baton Rouge, Louisiana, operation.

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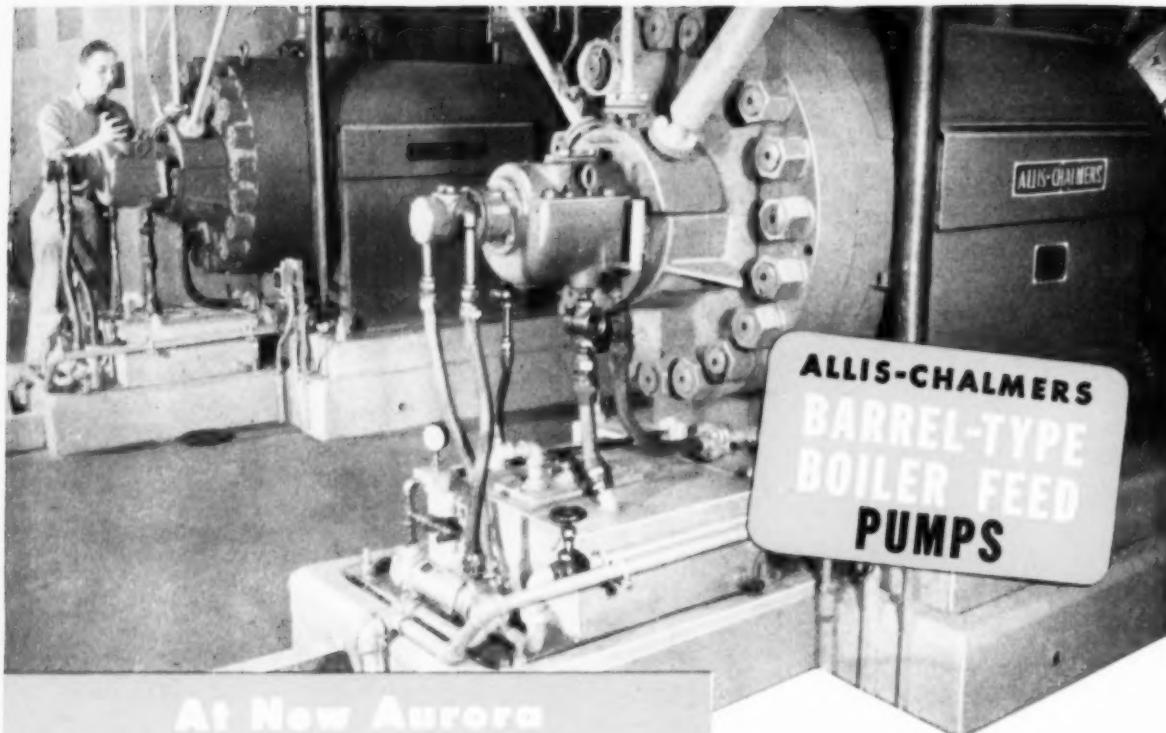
### **Handling at Bowaters Paper**

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At New Aurora  
Steam Electric Station...

The four Allis-Chalmers pumps at the Aurora Steam Electric Station — installed two to a power unit — are 6 x 6, 9 stage, rated 475,000 lbs. hr., 1035 gpm at a total discharge pressure of 1585 psig. Water temperature is 300 F.

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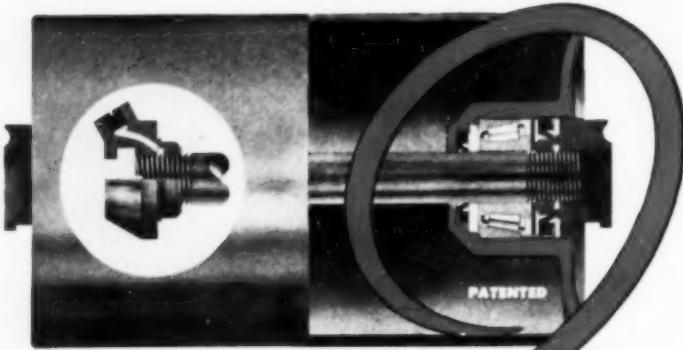
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# SOUTHERN POWER AND INDUSTRY

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1954

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# Facts and Trends

## **FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES**

November, 1954

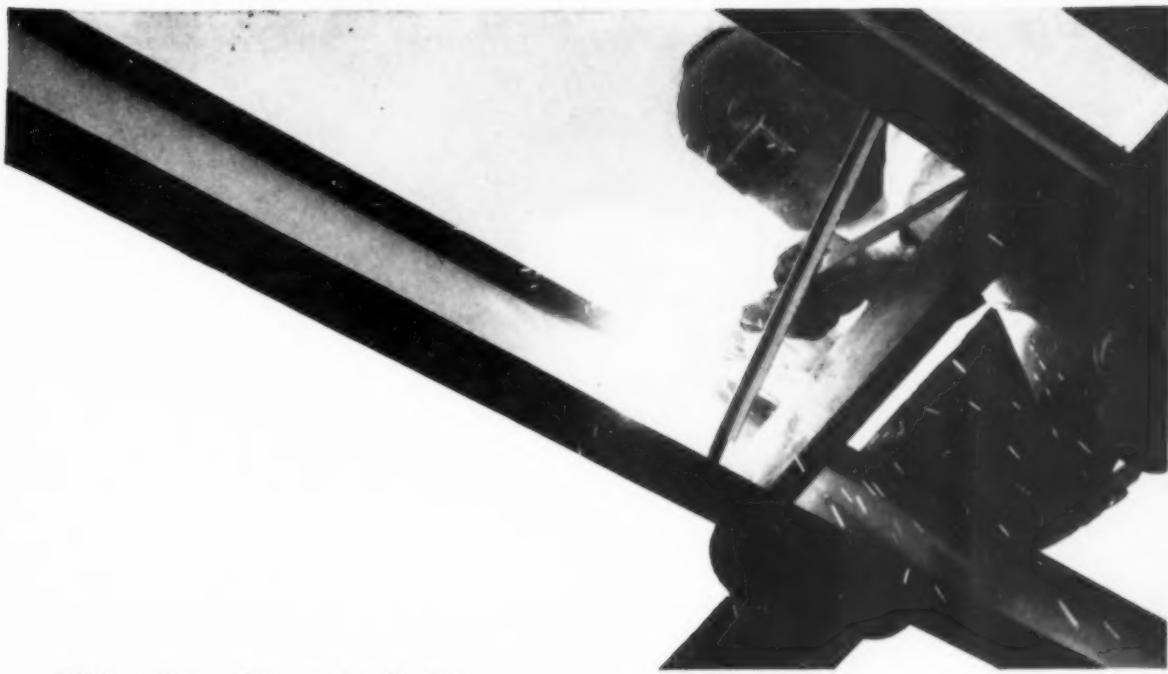
- **BIG SCALE DEMINERALIZATION**--At Baton Rouge, Louisiana, Gulf States Utilities Company is demineralizing 40 million pounds of water per day with a Permutit automatic 180,000 gph capacity plant. Operation features 100% makeup to 1,500 psi boilers.

Station growth, water supply, pilot plant tests, new plant features, operating procedures and performance data are reported in this issue by W. B. Gurney, Efficiency Engineer, Gulf States Utilities Company, and C. R. Stewart, Stone & Webster Engineering Corp.

- **GAS TURBINES** can ordinarily withstand operating temperatures in the range of only 1,400 to 1,600 degrees--greatly limiting their power and efficiency. However, an experimental unit recently operated continuously for 100 hours at 1,850 to 1,900 F and at a speed of 30,000 rpm with no apparent change in parts. Kennametal Inc. conducted the test using Kentanium (a sintered titanium carbide) in critical parts of the turbine.
- **JIB CRANE DESIGN** by R. G. LeTourneau Inc., Longview, Texas, features a self-supporting, full-revolving crane of all-welded steel construction. Its vertical column takes up less than 5 sq ft of floor space --yet the jib span serves an area of 1936 sq ft. Pillars serve as centralized outlet for air and electric services and storage for hoses and cords. Check SP&I's "Equipment, Supplies & Methods" department for details.
- **INDUSTRIAL TELEVISION** can now be used for direct viewing of furnaces and other high-temperature operations up to 3000 F. Using a high-efficiency closed-circuit water circulating system, RCA's water-cooled lens reduces infra-red radiation and lens temperatures at the camera below 120 F, giving stable, dependable camera operation.
- **GAS-INSULATED TRANSFORMERS** rated 2,000 kva, 69 kv, are now on the G.E. drawing boards and will soon be operated in field tests. Development, involving the first application of a high dielectric gaseous insulation to high voltage power transformers, may lead to the eventual displacement of oil and askarel-filled transformer construction by gas-filled, dry-type construction. The new units filled with sulphur hexafluoride gas are suitable for both indoor and outdoor installation.

One advantage of the new transformer will be its safer operating characteristics without the complications of present liquid dielectrics. In 1932 G.E. introduced Pyranol dielectric, a non-flammable liquid to reduce the fire hazard. However, Pyranol insulated power transformers are limited to ratings of 46,000 volts and below. Improved sound characteristics and lighter weight are two other advantages of the new design.

(Continued on page 6)



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## facts and trends (continued from page 4)

- **MOLYBDENUM DISULFIDE** in the plant lubrication field is featured in this issue of SP&I. Most plant lubrication requirements can be met by well refined oils and greases. However, solid film lubricants (graphite, soaps, waxes, white lead and molybdenum disulfide) can solve certain perplexing problems. MOLYBDENUM DISULFIDE is a relative newcomer to the solid film or "Dry" lubricant field.

Three years' experience with molybdenum disulfide in the operation and maintenance departments of the B & O Railroad in Baltimore is reported in this issue. Discussion covers what moly is, why B & O was interested, specific applications in their maintenance shops, emphasis on proper use, and special applications in many industries.

- **CLEANING STONE BUILDINGS** is no easy task especially when the surface is Texas limestone that hasn't been cleaned in 17 years. Maintenance men recently used PORTABLE ELECTRIC SANDERS instead of sand blasting methods to clean the 40,000 sq ft Hall of State Building in Dallas, Texas.

A thick accumulation of foreign material had penetrated the porous limestone and every inch of the building had to be sanded to a depth of 1/32" to 1/16" to remove oxides, fungus and dirt. Two crews of two men each using five Black & Decker 7" Heavy-Duty Sanders handled the job efficiently in five weeks time. A 16 open coat abrasive disc proved best for the job.

- **GOLD MINE PAYS OFF**--General Electric's Asheboro, North Carolina, automatic blanket plant has a real gold mine. In days gone past the 90 ft shaft with its tunnel network, actually produced yellow ore. Today, however, there exists a subterranean reservoir of water.

The plant's annual water requirement is slightly over one hundred million gallons. By recirculating water for industrial use in six cooling towers, while pumping an average of twenty-five thousand gallons per work day from the gold mine, the cost per thousand gallons of water is kept to an average of \$.035.

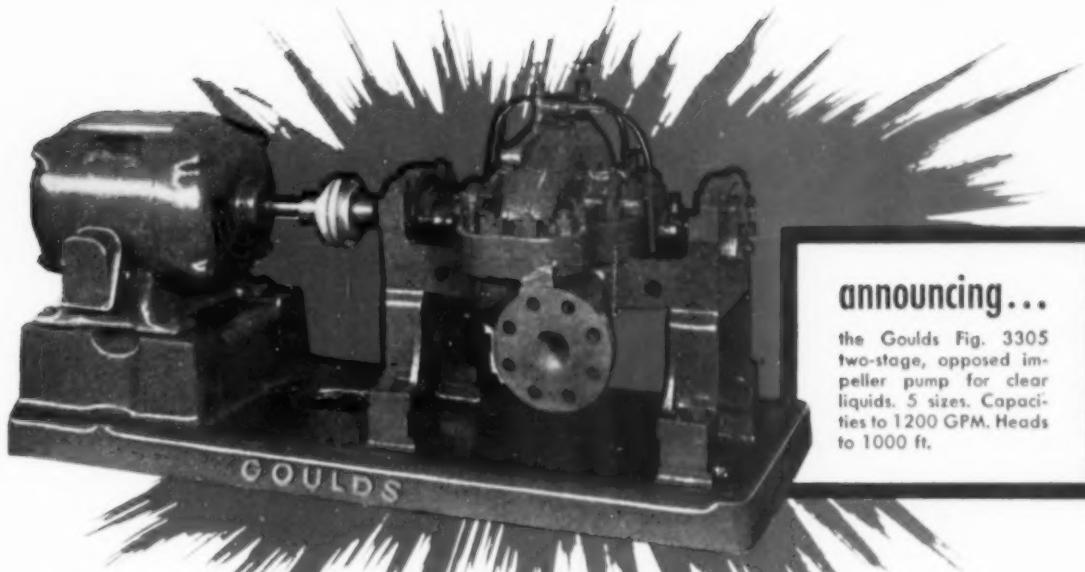
To supply the total requirement from municipal source would mean an annual cost of \$40,000. Actual cost of \$4,000 covers the purchase of municipal water for drinking and all expenses concurrent with recirculating and pumping operations. This results in an annual saving of \$36,000. The gold mine still pays off.

- **EFFICIENCY WITH LOW MANPOWER**--Operation of 5 boilers, 2 turbo-generators, 22 Ammonia and Freon-12 compressors in 4 compressor rooms, water softening equipment, 13 deep well pumps, 4 air conditioning units and the maintenance of this equipment plus all auxiliaries, with a total crew of 26 men including foremen and supervisors is a record hard to beat.

That's the picture at Pasco Packing Company's Dade City, Florida, plant. In addition the same crew maintains refrigeration equipment (pumps, tanks, water coolers, etc.) and makes water checks every 2 to 3 hours to assure close control of boiler feedwater treatment and boiler water. During the operating season the plant runs 24 hours a day and no one works over 8 hours a day except in an emergency.

Plant engineer A. T. Lohkamp accomplishes this by having one cold storage building of 100,000 sq ft area on fully automatic operation and making use of flow meters, flow controllers and automatic control wherever possible.

Write the editors for additional information on any of the above items.  
SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.



## announcing...

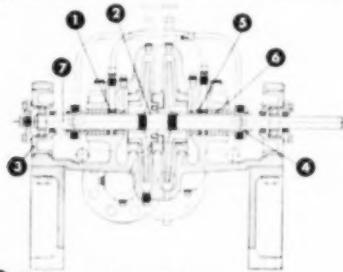
the Goulds Fig. 3305 two-stage, opposed impeller pump for clear liquids. 5 sizes. Capacities to 1200 GPM. Heads to 1000 ft.

### This new Goulds pump offers you 5 specific operating and maintenance advantages . . .

To reduce your liquid-handling costs through greater standardization, easier maintenance, and improved operating characteristics, Goulds engineers have developed the new Goulds Fig. 3305 two-stage, opposed impeller centrifugal pump. Here are the highlights—the result of 50 years concentration on industry's centrifugal pump needs.

#### 1 High operating efficiency, low maintenance cost

The Fig. 3305 pump combines the seven features indicated on the sectional drawing below to contribute a quality of dependable service which adds up to true operating and maintenance economy.



- 1 Teflon water-seal rings.
- 2 Stainless steel impeller key.
- 3 Bearing housing sealed against moisture and dirt.
- 4 Cowl-type glands suitable for use with quenching liquids.
- 5 Renewable stuffing box bushings.
- 6 Die-formed stuffing box packing.
- 7 Corrosion-resistant gland bolts.

#### 2 Reduces your spare parts inventory

Only two shaft and rotating parts assemblies provide for 5 pump sizes and 10 pump combinations. This means a remarkable range of parts interchangeability which you will find detailed on page 7 of the descriptive bulletin. Furthermore, most of the components of the Fig. 3305 shaft and rotating assemblies are interchangeable in the Fig. 3405 single-stage, double-suction pump which has won industry-wide acceptance in the year since it was introduced.

This high degree of standardization helps materially to reduce spare parts inventories. It also gives you great flexibility in adapting your Fig. 3305 pump to changing field requirements.

#### 3 Saves space

The short bearing span of Fig. 3305 pumps means considerable saving in floor space—as much as 50% in some comparisons with conventional designs of comparable capacity and head.

#### 4 Stuffing box to match your requirements

You can choose either a conventional stuffing box with gland or a mechanical seal, according to your need. And you can easily change from one to the other at any time.

#### 5 Simple to change rotation

A patented locking device makes it easy to change the rotation of this pump from right-hand to left-hand or vice versa *in the field and without additional parts*.

Before you select another pump for handling clear liquids at rates up to 1200 GPM and heads to 1000 ft., be sure you have the detailed cost-advantage story of Goulds new Fig. 3305 pump. We'll send you descriptive bulletin—promptly on request.



**Get the complete story**—This 12-page illustrated Bulletin No. 722-6, covers the new Goulds Fig. 3305 pump completely. It gives specifications, interchangeability tables, performance curves, dimensions,



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# NEWS for the South and Southwest

## G. E. Names Kastner Sales Mgr. at Rome, Ga.

CHRISTOPHER T. KASTNER has been appointed sales manager for the GENERAL ELECTRIC COMPANY'S Medium Transformer Plant at ROME, GA., according to an announcement by Rome Plant Manager D. B. LAWTON.

Mr. Kastner, whose headquarters will be at Rome, will be responsible for the sales and promotion of medium transformers, the power transformers in the range of ratings 501 to 5000 kva single-phase, 501 to 10,000 kva three-phase, 69 kv and below.

A graduate of Yale University with a mechanical engineering degree in 1946, Mr. Kastner previously attended schools in Memphis, Tenn. He joined General Electric in July 1946 on the company's Test Program. Following Lynn and Schenectady assignments, he went to Power Transformer Sales in Pittsfield. In January, 1952, he was appointed supervisor of travel-

ing specialists and later supervisor of Medium Transformer Sales. He will be succeeded at Pittsfield by J. Benning Monk.

Mr. Kastner is an associate member of the American Institute of Electrical Engineers.

## Texas Metal Names Dillon

TEXAS METAL AND MANUFACTURING COMPANY has announced the appointment of the DILLON SCALE AND EQUIPMENT COMPANY as the distributor for the Tex-Met Conveyor System, according to Henry I. McGee, Texas Metal president.

Texas Metal, located at 6114 Forest Park Road in the Dallas industrial section, is the Southwest's first manufacturer of pre-engineered conveyor systems for industry, commerce, agriculture and warehousing.

Headed by Ed M. Dillon, Dillon

Scale and Equipment Company is a pioneer Texas conveyor distribution firm and is located at 3907 Elm Street, in Dallas.

Other distributors and dealers will be appointed throughout the United States.

## FUTURE EVENTS Of Engineering Interest

**AMERICAN SOCIETY FOR METALS**, W. H. Eisenman, Secy., 7301 Euclid Ave., Cleveland 2, Ohio.  
Nov. 1-5, National Metal Congress and Exposition, International Amphitheater, Chicago, Ill.

**AUTOMATIC CONTROL EQUIPMENT SHOW**, Strauss, Spigler & Kline, Mgr., Philadelphia, Pa.  
Nov. 21-22, First Automation Show, Waldorf-Astoria Hotel, New York, N. Y.

**AMERICAN SOCIETY OF MECHANICAL ENGINEERS**, C. E. Davies, Secy., 29 West 39th St., New York, N. Y.  
Nov. 28-Dec. 3, Annual Meeting, Statler Hotel, New York, N. Y.

**21ST NATIONAL EXPOSITION OF POWER AND MECHANICAL ENGINEERING**, E. K. Stevens, Mgr., International Exposition Co., 480 Lexington Ave., New York 17, N. Y.  
Dec. 2-7, Power Show, Commercial Museum, Philadelphia, Pa.

**NATIONAL GASOLINE ASSOCIATION OF AMERICA**, Wm. F. Lowe, Secy-Treas., 422 Kennedy Bldg., Tulsa 2, Okla.  
Dec. 3, Panhandle-Plains Regional Meeting, Herring Hotel, Amarillo, Texas.  
Feb. 25, 1955, Permian Basin Regional Meeting, Scharbauer Hotel, Midland, Texas.  
Apr. 13-15, 1955, Thirty-Fourth Annual Convention, Baker and Adolphus Hotels, Dallas, Texas.

**HEATING AND VENTILATING EXPOSITION**, E. K. Stevens, Mgr., International Exposition Co., 480 Lexington Ave., New York, N. Y.  
Jan. 24-28, 1955, 12th International Heating & Ventilating Exposition, Commercial Museum and Convention Hall, Philadelphia, Pa.

**INSTRUMENTATION FOR THE PROCESS INDUSTRIES**, K. L. Puffer, Pub. Chm., P. O. Box 6236, Houston 6, Texas.  
Jan. 26-28, Tenth Annual Symposium, School of Engineering, Chemical Engineering Dept., Texas A&M College, College Station, Texas.

**NATIONAL ASSOCIATION OF PURCHASING AGENTS**, Fred D. Bradley, Chm., Public Utility Buyers' Group, Southern Union Gas Co., Burt Bldg., Dallas 1, Texas.  
Feb. 13-15, 1955, 24th Annual Mid-Winter Conference, Shamrock Hotel, Houston, Texas.

**SOUTHERN SAFETY CONFERENCE, INC.**, W. L. Groth, Exec. Dir., P. O. Box 5927, Richmond 25, Va.  
Feb. 27-Mar. 1, 1955, 16th Annual Conference and Exposition, Jung Hotel, New Orleans, La.

**INDUSTRIAL MARKETING ASSOCIATES, INC.**, John Paul Taylor, Exec. Secy., 129 Pleasant St., St. Joseph, Mich.  
May 22-26, 1955, Annual Meeting, The Cloister, Sea Island, Georgia.



**NEW OFFICERS OF THE PUBLIC UTILITIES ASSOCIATION OF THE VIRGINIAS** elected at the organization's 36th Annual Meeting at White Sulphur Springs, W. Va. Left to right, they are Don B. Potter, administrative vice president, Monongahela Power Company, Fairmont, W. Va., who was elected first vice president of the association; A. J. Bowen, division manager, Northern Virginia Power Company, Winchester, Va., who is the new association president; Erwin H. Will, vice president and general manager, Virginia Electric and Power Company, Richmond, Va., the organization's retiring president; and William J. Stewart, assistant general manager, Wheeling Electric Company, Wheeling, W. Va., elected second vice president of P.U.A.V. Other association officers reelected but not present when the picture was made are R. W. McKinnon, Roanoke, Va., executive secretary; John C. Parrott, president, Roanoke Gas Company, Roanoke, Va., P.U.A.V. treasurer; and A. T. Ellett, also of the Roanoke Gas Company, assistant treasurer. The association is composed of electric, gas, telephone and water companies in Virginia and West Virginia.



## For low-cost, dependable steam, **Upjohn burns coal the modern way**

Upjohn has long been famous as a manufacturer of pharmaceutical products. Because of the nature of these products, it was necessary that the steam plant of Upjohn's new Portage Road Plant, near Kalamazoo, Michigan, operate cleanly as well as economically. Therefore, coal was chosen to fire its boilers.

Today Upjohn's ultramodern steam plant supplies steam at only 40c to 42c per 1,000 pounds. It is clean and efficient, with no dust or smoke nuisances, and ash handling is fully automatic. At peak load, the three boilers shown above, plus a fourth recently installed, deliver up to 115,000 lbs. of steam per hour.

### **Investigate Your Fuel Costs**

If you're planning to modernize your plant or build a new one—or if you are just interested in cutting fuel costs—find out how coal, burned the modern way, compares to other fuels. Talk to a consulting engineer

or your nearest coal distributor. Their advice may save you thousands of dollars every year.

### **facts you should know about coal**

In most industrial areas, bituminous coal is the lowest-cost fuel available.

Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar.

Automatic coal and ash handling systems can cut your labor cost to a minimum.

Coal is the safest fuel to store and use. No dust or smoke problems when coal is burned with modern equipment.

Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

**BITUMINOUS COAL INSTITUTE**

A department of National Coal Association • Southern Building, Washington 5, D.C.

## News for the South and Southwest (continued)



Eugene Gordon, Henry Startzman, S. S. Bradford, and G. S. Humphrey

### Potomac Edison Names Three New Vice Presidents

EUGENE GORDON, HENRY H. STARTZMAN, and S. SYDNEY BRADFORD have been elected Vice-Presidents of the POTOMAC EDISON COMPANY. The announcement followed the action of the board on the retirement of Vice-President GEORGE S. HUMPHREY.

Mr. Gordon will serve as Vice-President in charge of power stations and

power generation; Mr. Startzman will be Operating Vice-President; and Mr. Bradford will hold the post of Commercial Vice-President.

Mr. Gordon has been associated with the Power Department since 1923. He is presently serving on a temporary loan basis with the West Penn Power Company as acting manager of their Power department. Mr. Gordon is a native of Baltimore, Md., and received his education at Balti-

more Polytechnic Institute and Johns Hopkins University.

Mr. Startzman began his career with the company as retail sales manager in Cumberland, Md., in 1928. In 1951 he was elected to the post of assistant vice-president and chief engineer. He held this post until he assumed his present duties as operating manager and chief engineer.

Mr. Bradford has been associated with the Potomac Edison Company's Promotional Department since 1934 when he took the post of promotional manager until 1953 when he was made general commercial manager, the post he held at the time of his recent promotion.

Mr. Humphrey had served as Vice-President in charge of Operations and Engineering for the Potomac Edison System since 1928. He will continue to serve as a director of the company and chairman of the West Penn Electric System Engineering and Construction Committee pending the completion of a number of large power plant projects throughout the system.

### Skinner Engine Co. Carolinas and Georgia

SKINNER ENGINE COMPANY, Erie, Pa., manufacturers of single-cylinder horizontal and multi-cylinder vertical "Universal Unaflo" steam engines, is now represented in NORTH CAROLINA, SOUTH CAROLINA, and GEORGIA by FLAGG, BRACKETT & DURGIN, INC., 1114 Liberty Life Bldg., Charlotte, N. C. E. PETER GARWOOD is in charge of this office.



### Girdler Completes Hydrogen Plant for Newport Industries

As part of its current expansion program, NEWPORT INDUSTRIES, INC., recently added a Hygirtol hydrogen manufacturing plant to its facilities at PENSACOLA, FLA. It is designed to operate over a wide production range. THE GIRDLER COMPANY, LOUISVILLE, KY.—a division of the National

Cylinder Gas Company—performed all design, engineering, procurement and construction services.

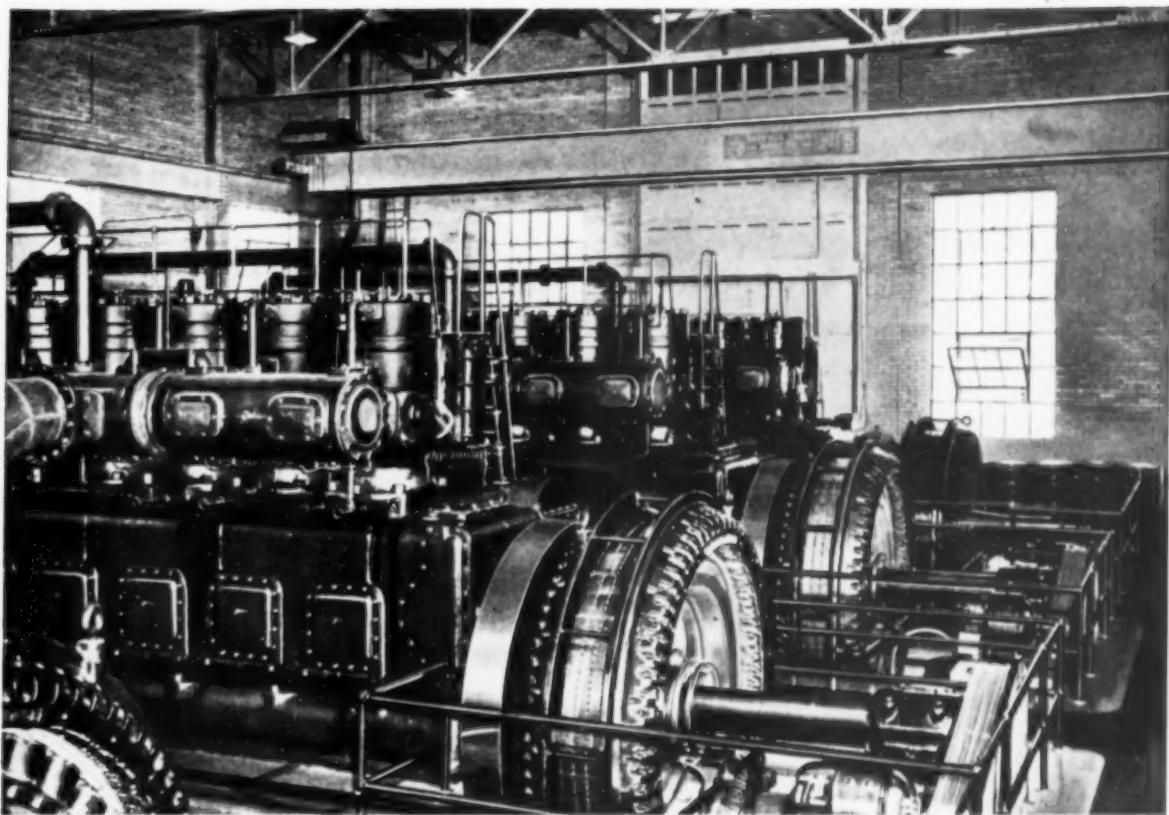
The hydrogen is produced by the catalytic steam-reforming of natural gas. Two stages of carbon monoxide conversion, each followed by carbon dioxide removal, and a final methanation stage are employed for the purification of the reformer furnace effluent. The purified hydrogen is compressed to 1050 psig.

### Leinart Opens New Atlanta Warehouse

LEINART ENGINEERING CO., authorized distributor of Parker tube and hose fittings and Parker o-rings, has opened a stocking warehouse at 332 Techwood Drive, N.W., ATLANTA, GEORGIA.

This company, with a modern warehouse also in KNOXVILLE, TENN., has long been a supplier to Southeastern industry. Senior partner in the firm is B. H. LEINART. For technical assistance, the distributor has available the services of LEWIS C. ELY, Atlanta district manager of THE PARKER APPLIANCE COMPANY of Cleveland, Ohio.

More News—Page 94



## "We're Proud of This Plant!"

*says Don H. Decker, — Plant Supt., Thumb Electric Cooperative, Ubly, Mich.*

Manager Orville Hurford and Mr. Decker are justifiably proud of their 4-diesel engine generating station. The plant has been an outstanding financial success since the day it was first opened. Several times it has occupied #1 position on the REA Running Plant capacity chart.

Mr. Decker writes, "A large part of our operating success we attribute to Sinclair GASCON® D oil. It has given us an excellent rate of consumption while reducing wear. In fact, cylinder and piston ring wear is much below normal based on other plants of equal capacity. Something else we appreciate is the timely visits of the Sinclair Lubrication Engineers."

Top quality lubricants plus the assistance of Sinclair Lubrication Engineers are two of the reasons why Sinclair can play a large part in the success of *your* operation. Your local Sinclair Representative will be happy to explain the remaining reasons. Phone him or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

### **SINCLAIR DIESEL LUBRICANTS**

*save wear and Replacement*

# Announcing An Outstanding Offer...

**"PLANT MAINTENANCE"—A BIG NEW  
135-PAGE MANUAL OF PRACTICAL SOLU-  
TIONS TO MAINTENANCE PROBLEMS PLUS  
36 VALUE-PACKED ISSUES OF SOUTHERN  
POWER AND INDUSTRY FOR ONLY \$3.00**

Contents include informative articles on such diversified maintenance subjects as: "One Card Maintenance System"; "How to Reduce Corrosion Costs"; "Caustic Embrittlement in Boilers"; "Graphitization"; "Cable Splicing System"; "Damaged Conveyor Belting"; "Display Board Guides Electricians"; "Plastic Pipe"; "The Alignment of Shafts" and many others—ninety-three in all.

Everywhere today we hear from industrial men about the ever-lowering profit margin and the need for more efficient production methods . . . decreasing costs . . . minimizing waste . . . increasing profits . . . the need, in short, for a well-rounded, smoothly-functioning maintenance program which insures better productivity.

That's why companies are searching for more efficient maintenance methods and materials. If they are to sustain even a minimum profit level, many of them must step up maintenance and improve procedures.

## A BETTER-MAINTENANCE "MUST"

Engineers in Southern industrial, power, and large service plants will find answers to many of their maintenance problems in "Plant Maintenance", the great new book just released by S.P.I. Composed of nearly a hundred selected articles on plant maintenance—reprinted from recent issues of SOUTHERN POWER AND INDUSTRY—"Plant Maintenance" presents in concise, convenient, and readable form a wealth of up-to-the-minute, time-saving tips to the engineers responsible for plant up-keep in Southern and Southwestern industrial organizations.

**Clip the coupon below and take advantage of this out-  
standing offer TODAY!**

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Enter my subscription order for 36 issues of SOUTHERN POWER AND INDUSTRY, and send my copy of "Plant Maintenance" right away.

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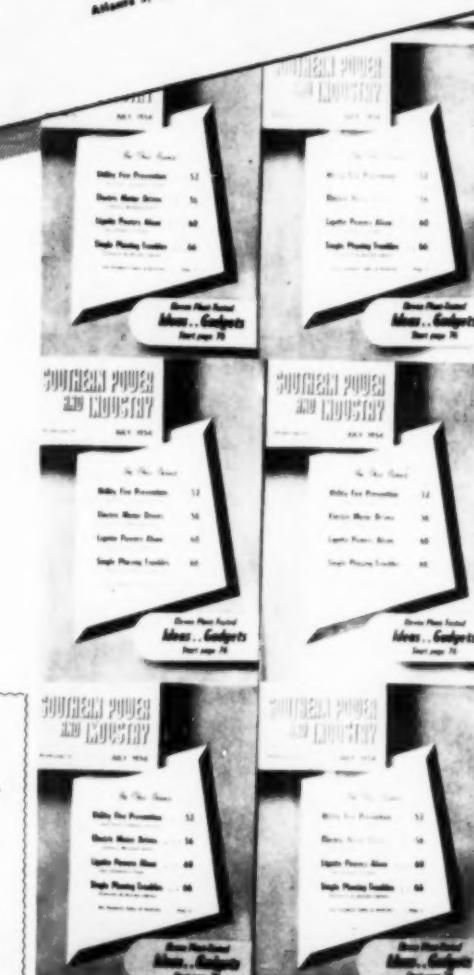
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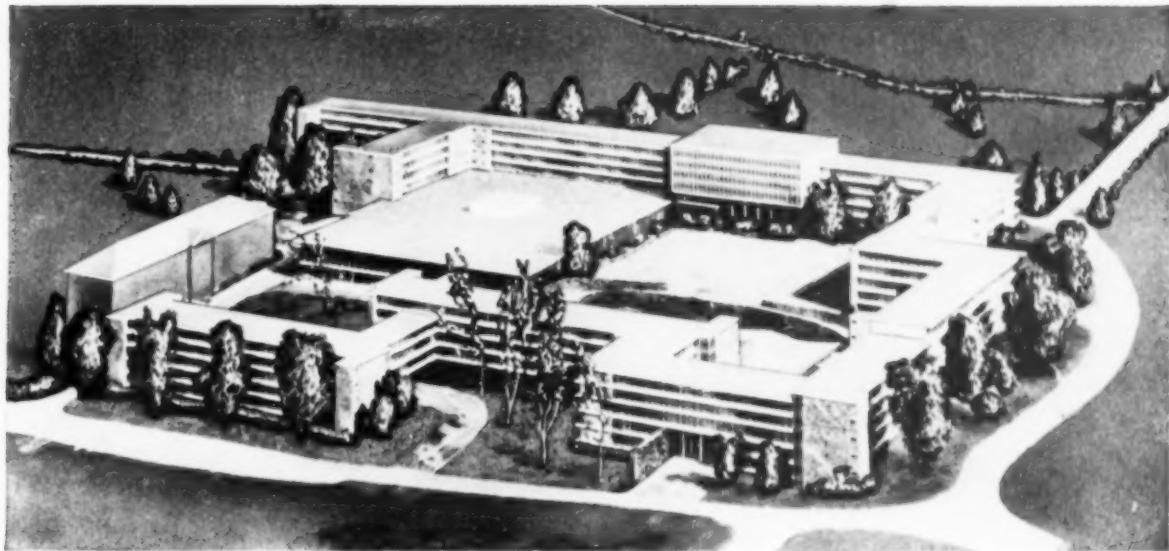
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Bill My Company

SOUTHERN POWER AND INDUSTRY  
806 Peachtree Street, N.E.  
Atlanta 5, Georgia



*Oh, I see*



Architects for these \$5,000,000 Dormitories are Wm. G. Lyles, Bissett, Carlisle & Wolff of Columbia, South Carolina.

... they're using our valves at  
**Clemson College Dormitories**



Scheduled for occupancy this fall, Clemson College Dormitories, Clemson, South Carolina, will contain 1,000 rooms. This structure, built in the form of a quadrangle, represents the latest in architectural design and construction.

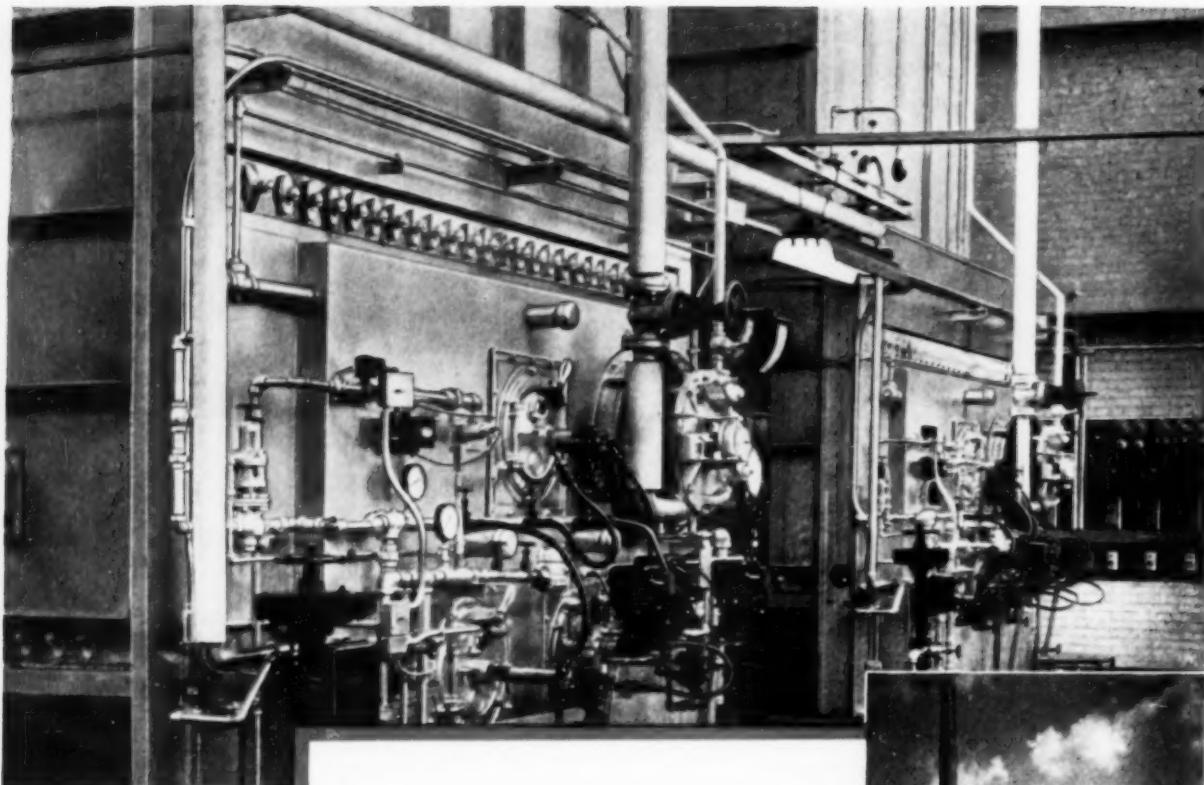
OIC Valves were selected for much of the piping here by Daniel Construction Company, Inc., through OIC's distributor, Construction Supplies, Inc., both of Greenville, South Carolina—evidence of the confidence which builders everywhere have in OIC Valves.

The OIC Long Line of Valves takes care of every valving requirement in structures of this kind. For a free copy of OIC's Catalog Digest, write:

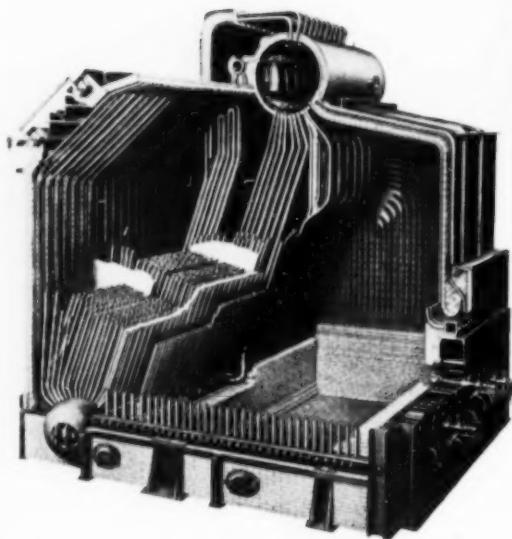
**THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO**

**VALVES**

**BRONZE & IRON, FORGED & CAST STEEL,  
LUBRICATED PLUG VALVES**



This installation of B&W Integral-Furnace Boilers at the Chicago plant of Wesson Oil Co. is producing "cheap" steam through efficient operation and with minimum maintenance and labor.



Sectional view of typical oil-fired B&W Integral-Furnace Boiler similar to units in service at Wesson Oil plant. Suitable for oil, gas, and coal firing the Integral-Furnace Boiler family is available in steam capacities to 350,000 lb. per hr. Cost saving features covered in bulletins available on request.

*on the record...*

**2 B&W Integral-Furnace Boilers**

**at**

**Wesson Oil's New Chicago Plant  
provide**

# PERFORMANCE *with* ECONOMY



Despite unusually severe operating conditions, with frequent and wide load swings at odd times and without warning, two B&W Integral-Furnace Boilers at this plant are providing steam efficiently and economically, to the complete satisfaction of company engineers. And performance such as this is being duplicated in plant after plant across the country—both new and old—where operational savings over a relatively few years are proving sufficient to cancel the initial investments.

Southern Cotton Oil Company—processor of the popular Wesson Oil and hydrogenated shortening—needed a fully-reliable steam supply for its new Chicago plant, with "push-button" operation wherever practical. To meet these requirements, they chose long-life, automatically controlled B&W Integral-Furnace Boilers. Oil-fired at present, they can also burn gas and may be converted readily to coal firing if conditions warrant. Each unit has a steam capacity of 40,000 lb per hr at pressures to 250 psi.

They supply steam for year 'round processing and carry the additional load for heating during winter months.

An efficient system of automatic controls makes operation of these B&W Integral-Furnace Boilers quite simple. This emphasis on automatic operation has "paid off" at the new plant, which is producing steam with minimum maintenance and operating labor. These advantages are, of course, reflected in the plant's low overall steam cost.

Layout of the boilers and plant was under the direct supervision of Mr. L. C. Haskell, vice president of Southern Cotton Oil, working with the company's consulting engineers, The Austin Company, who designed and constructed the building. B&W erected the boilers, then ran complete operational tests before turning them over to Southern Cotton Oil Company as satisfactory, operating units. We shall be glad to discuss details of any unit in the B&W "family" of Integral-Furnace Boilers in terms of your steam requirements. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd St., New York 17, N. Y.

#### Service-Proved

#### COST SAVING FEATURES

#### of B&W Integral-Furnace Boilers for Steam Requirements from 2900 to 350,000 Lb Per Hr.

- Minimum floor space and headroom requirements
- High fuel economy
- Smokeless combustion
- Adaptable to all fuels and firing methods
- Economical fast steaming
- Water-cooled furnace
- Clean, dry steam at all ratings, even with high boiler-water concentration
- Quick response to wide and heavy load swings
- Easy to inspect and clean
- High availability with least attention

**BABCOCK  
& WILCOX**





**357 MODERN LUBRICATION**—Bulletin—Describes methods of modernizing with Mansel lubricators—pumps and compressors, wood and steel working machinery, presses, production and handling equipment.—MANSEL DIVISION OF FRONTIER INDUSTRIES, INC.

**390 CASINGS AND PANELBOARD**—Booklet F3, 27 pages—Depicts plant and equipment for producing breedings, casings, panel boards and other items of steel fabrication up to  $\frac{1}{4}$ " thickness. Profusely illustrated with representative photographs of products.—THE KIRK & BLUM MANUFACTURING COMPANY.

#### PIPING, VALVES, FITTINGS STEAM SPECIALTIES, TRAPS

**400 CONTINUOUS BLOW-OFF VALVES**—Bulletin—Describes the Uniblow complete blow-off unit, with continuous blow-off valve, sediment chamber, clean-out valve, by-pass line. This unit features stainless steel rotary disc valves which offer 15 calibrated orifices to provide any rate of flow—saving on fuel, and giving continuous service, without moving parts to wear out or leak.—THE UNIBLOW VALVE COMPANY.

**403 VALVE OPERATORS, SPROCKET RIMS**—Bulletin 88—Describes and illustrates adjustable sprocket rims with chain guides, and other forms of Babbitt valve operators and controls.—BABBITT STEAM SPECIALTY CO.

**410 PIPE HANGERS**—Bulletin 188, 13 pages—Describes National counter-poise pipe hangers for high temperature piping systems in steam plants, refineries, chemical plants, and the like. Graphs give aid in selection. Dimensions, erection and field adjustment instructions. Illustrations of typical installations.—NATIONAL VALVE & MANUFACTURING COMPANY.

**415 FORGED STEEL VALVE**—Catalog 104, 28 pages—Illustrates and describes in detail specifications of cast and forged steel valves for high pressure, high temperature units in boiler rooms, industrial and technological plants, and in petroleum service.—EDWARD VALVES, INC.

**421 AIR TRAPS**—Bulletin No. 2021, 4 pages—Describes purpose, selection, installation of ball float and inverted bucket traps for automatic drainage of water from compressed air systems. Prices included.—ARMSTRONG MACHINE WORKS.

**452 LUBRICATED PLUG VALVES**—Catalog, 30 pages—Describes iron and cast steel line of lubricated plug valves, and all accessories. Gives dimensions for sizes from 1" to 34", pressure and temperature ratings, complete service details.—THE OHIO INJECTOR COMPANY.

**465 STEAM-JACKETED VALVES**—Bulletin E-390—Describes the design, operation and special arrangement of steam jackets for handling viscous materials such as heavy petroleum, coal tar and chemical products, which congeal or harden under operating conditions. Illustrated, with engineering data.—EVERLASTING VALVE CO.

**491 CONTROL VALVES**—Catalog 1500-B, illustrated—Describes complete line of Domotor, solenoid-operated and handwheel single seat control valves for handling difficult fluids under extremes of temperature and pressure. Offers full, unrestricted flow, positive plug and seat alignment and directional flow flexibility.—THE ANNIN COMPANY

**492 VALVE CONTROLLER**—Bulletin 2500, 8 pages, gives construction features, engineering design and data, characteristics and performance, specifications and applications, etc., of the "Positrol," Fisher Series 2500 Valve Controller.—FISHER GOVERNOR CO.

#### MAINTENANCE PACKING GASKETS, LUBRICATION

**512 CLEANING GAS WASHERS**—Bulletin 451—Describes the cleaning of clogged, inefficient gas washers while in operation—with many case studies.—DOW-ELL, INC.

**517 TUBE INSERTS**—Bulletin, 8 pages—Describes the design, application and accomplishments of metal inserts or wearing strips for the inlet ends of tubes in condensers, heat exchangers, etc.—CONDENSER SERVICE & ENGINEERING CO., INC.

**521 WELDING AND FLAME CUTTING OF WROUGHT IRON**—Bulletin—Gives complete information on the processes and procedures used in welding wrought iron, and flame cutting wrought iron. A complete information on physical properties of wrought iron welds. Additional section on Flame Descaling.—A. M. BYERS CO.

**533 REMOVAL SCALE AND RUST**—Booklet 4205-R-12—Tells how to remove scale and rust, using Oakite Compound No. 22—giving greater safety, efficiency and higher load factor to various elements in all sorts of plants and operations.—OAKITE PRODUCTS, INC.

**579 MAINTENANCE COATINGS AND PAINTS**—Specification Bulletin—Gives technical data covering 85 maintenance paints and protective coatings, giving in concise form the use to which each is to be put, the type, color, application, and resistance characteristics.—THE ARCO CO.

#### ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

**610 UNIVERSAL JOINTS**—Bulletin CS-10, 8 pages—Describes bevel gear universal joints designed to give positive transmission of torsion regardless of shaft angle—from 0° to 135° on vertical center lines, from 0° to 360° on horizontal center lines.—CONDENSER SERVICE & ENGINEERING CO., INC.

**629 GRIPPER SLINGS**—Price and Data Book, 20 pages—Describes gripper slings of woven wire for materials handling, with numerous case study illustrations. Engineering data concerning strength, capacity, fabric, etc.—THE CAMBRIDGE WIRE CLOTH COMPANY.

**631 SCREW CONVEYORS**—Catalog ID-541, 68 pages—Illustrates and describes standard and special types of conveyors, with engineering data necessary for selection. Tables give sizes, types, speeds, horsepower and other information. Accessories included.—CONTINENTAL QIN COMPANY, INDUSTRIAL DIVISION.

**636 CONVERSION TO LPG—ENGINE, TRUCK**—New folder "Stop Carbon Monoxide 'Hangover'" describes the application of Beams butane-propane carburetion to fork lift trucks—to increase engine life, rid air of carbon monoxide, reduce down-time, sludge and carbon formations, oil changes, irregular power and high fuel costs. Of particular value in indoor material handling—easy to install, superior in performance, simple and compact in design.—THE PARK DALE COMPANY.

**653 MONORAIL STACKER CRANES**—Bulletin AMS-1—Outlines advantages gained by using specially designed stacker cranes for the storage of various materials under specific conditions.—AMERICAN MONORAIL CO.

**685 POWER TRANSMISSION PRODUCTS**—Brochure, 8 pages—Discusses flexible couplings, variable speed pulleys and transmissions, universal joints, and gives specifications and information for the application and selection of equipment, all well illustrated.—LOVEJOY FLEXIBLE COUPLING CO.

**687 INDUSTRIAL CRANES**—Bulletin PT 1555, 8 pages—Describes a new line of Push-Type Cranes with improved construction features, including light duty models available in five different capacities, and heavy duty models available in seven different capacities. Illustrations, applications.—INDUSTRIAL CRANE & HOIST CORP.



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Equipment and Review Editor

SOUTHERN POWER AND INDUSTRY

806 Peachtree St., N. E.

Atlanta 5, Ga.

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Also send further information on following New Equipment (page 104)

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**708 COOLING TOWER DRIVES**—Catalog CT-53—Gives information on the use of gear reduction drives for cooling tower applications—includes worm gear units, spiral-bevel units and helical-spiral-bevel units. Gives construction and operating details, with illustrations and selection data.—PHILADELPHIA GEAR WORKS.

**726 INTERNAL TREATMENT OF BOILER WATER**—Bulletin 47—Explains the Nacon system of internal treatment which performs four important chemical functions to keep boilers and auxiliaries free of scale and corrosion.—THE NATIONAL ALUMINATE CORP.

**738 ZEOLITE WATER SOFTENERS**—Bulletin—Describes in detail the operation and application of Cochrane hydro-matic single-control-valve Zeolite softeners which combine operations in a single unit for service, back-wash, brine and rinse, and two stand-by positions.—COCHRANE CORP.

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**831 ELECTRIC HEATING CABLE**—Bulletin F-1527—Describes "Thermowire," a low cost, easily applied flexible electric heating cable, a versatile new product with many uses and applications in industrial and commercial processing.—EDWIN L. WIEGAND CO.

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**877 CONTROL CENTERS**—Bulletin B-5621, 31 pages—Describes the characteristics of control centers designed for flexibility of application, ease of servicing and safety of operating personnel; stresses desirability of centralizing all controls of an entire system in one group of enclosures. Describes three types of control centers.—WESTINGHOUSE ELECTRIC CORP.

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**MISCELLANEOUS . . . SAFETY, BUILDING EQUIPMENT, METALS**

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**956 SWIMMING POOL EQUIPMENT**—Bulletin WC-109—Describes a complete line of swimming pool equipment, including filters, chemical feeders, sterilizers, hair and lint catchers, pool cleaners, re-circulating pumps, heaters, fittings and accessories—dimensions, capacity and other tables.—GRAVER WATER CONDITIONING COMPANY.

**992 FIRE PROTECTION**—Bulletin 2319 describes Blaw-Knox Deluge systems, wet and dry pipe sprinkler systems, water spray and fog systems, rate-of-rise sprinkler systems, etc., and indicates how a sprinkler system pays for itself out of insurance savings.—BLAW-KNOX SPRINKLER DIV., BLAW-KNOX CONSTRUCTION CO.

**994 MULTICLONE MECHANICAL DUST COLLECTORS**—Booklet M-264—Describes, with illustrations and diagrams, the basic principles of dust recovery by mechanical means at maximum efficiency.—WESTERN PRECIPITATION CORP.

Continued on page 118

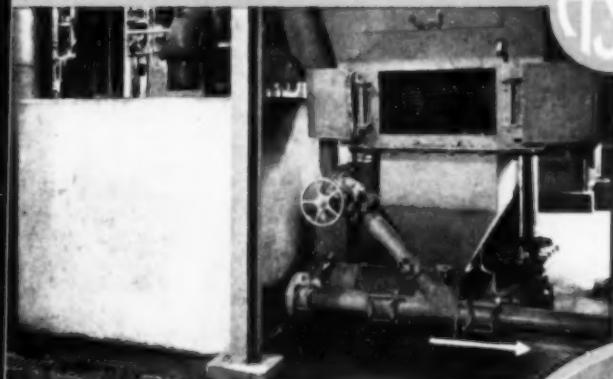
**List Items You Want,  
Tear Out and Mail  
One of the  
Attached Cards  
Now!**

Please be sure to fill in your Firm's Name and your position on the Coupon. This service cannot be extended to you unless this information is furnished.

## Modern Paperboard Mill

Modern

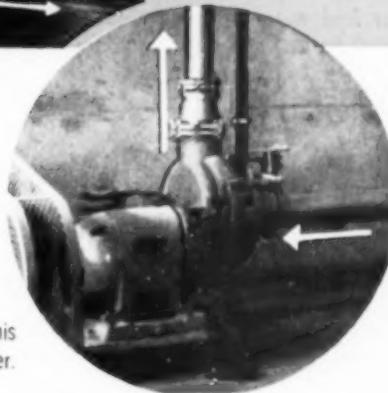
## Ash & Dust disposal



Stoker ash (gravity fed through a sizing grid) and flyash (gravity sluiced into surge tank) here start their journeys through 25 ft of suction pipe to ash pump and then through 400 ft. of 4" discharge line to the lagoon. Water supplied to system at 50 psi.

### Hydroseal Ash Pump—450 GPM capacity

Suction piping is arranged so that this pump will serve also an additional boiler.



The A-S-H Hydro-Vacuum ash and dust handling system in this power plant of a new streamlined paperboard mill is evidence that hydraulic operation need not be limited to large installations. Because the suction of a Hydroseal Ash Pump is used to pull material through a long suctionline, the initial expense of high-pressure sluicing is avoided. Ash from a spreader-type stoker-fired boiler of 65,000 lb-per-hr capacity and flyash are discharged into an effluent lagoon. Through natural settling of solids, the water overflow into a nearby river complies with anti-pollution laws.

In any boiler plant  
...large or small,  
there is opportunity for  
the application of A-S-H  
engineering experience.

THE ALLEN-SHERMAN-HOFF CO.

Dept. L—259 E. Lancaster Ave., Wynnewood, Pa.  
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# HYDROJET

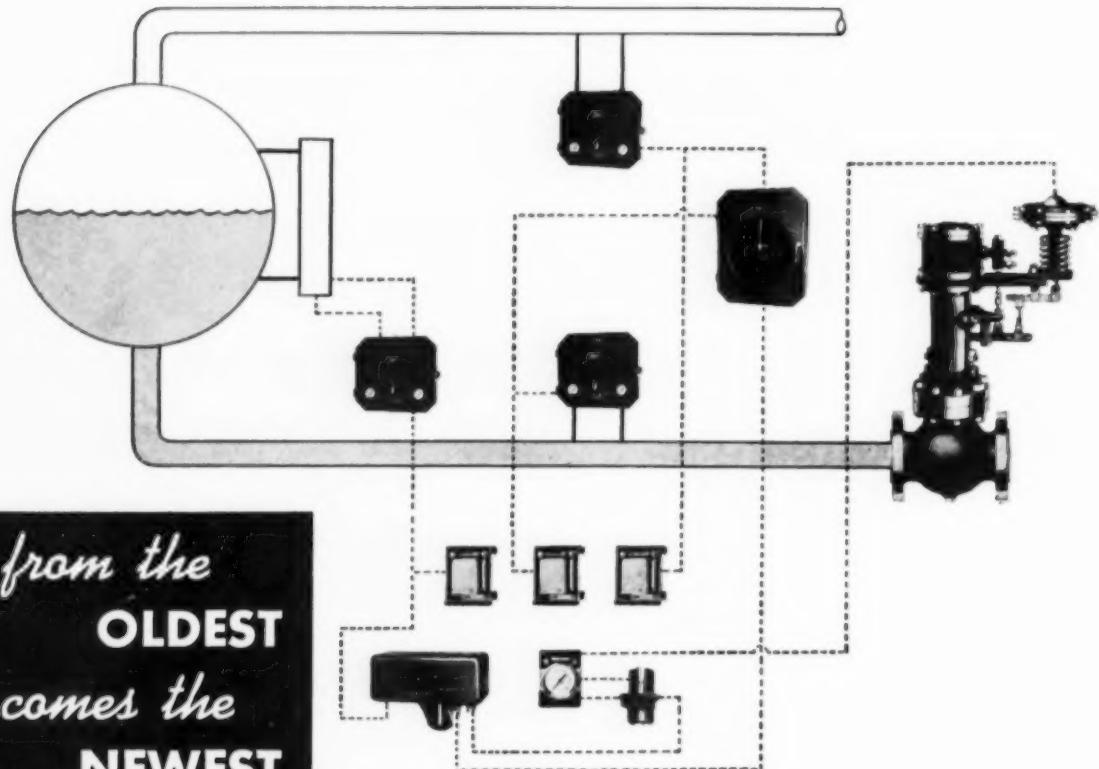
(hydraulic)

materials handling systems



# HYDROVAC

(pneumatic)



## IN THREE-INFLUENCE BOILER FEED WATER CONTROL

*Type 3-L with instrumentation by Taylor*

COPES . . . the oldest name in boiler feed water regulation . . . now offers you the newest in three-influence feed water control. Combined in the new COPES Type 3-L are . . .

. . . the scientific balance, characterized ports and rugged dependability of the COPES control valve.

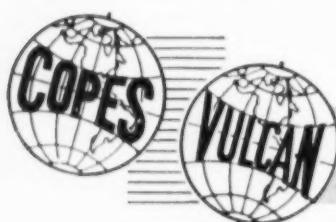
. . . plus the unequalled responsiveness and accuracy of *instrumentation by Taylor*.

And COPES-Vulcan assumes undivided responsibility for service, whenever or wherever needed . . . throughout the life of the installation.

Write for Bulletin 1013. It tells the story of the newest feed water control to come from COPES . . . the oldest name in boiler feed water regulation.

### COPES-VULCAN DIVISION

CONTINENTAL FOUNDRY & MACHINE COMPANY  
 ERIE 4, PENNSYLVANIA



### BOILER CONTROL

WITH INSTRUMENTATION

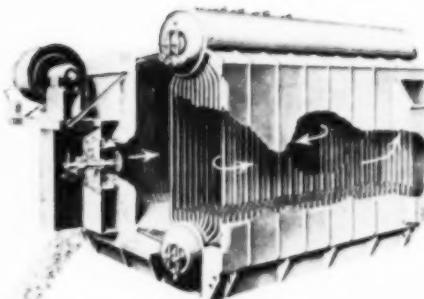
BY *Taylor*

*Three-influence mechanically-operated and  
 three-influence electrically-operated  
 regulators are also available.*

# STANDARD BOILERS THAT SET INDUSTRY STANDARDS

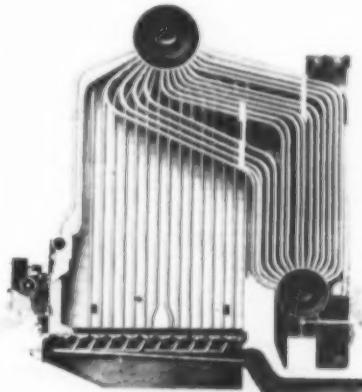
Whatever your steam needs, in the complete C-E line of fuel burning and steam generating equipment, you will find a type and size just right for you.

*In the moderate capacity range, for example—from 4,000 to 120,000 pounds of steam per hour—the three standardized C-E Boilers shown here offer advantages of economy and performance that make them standout values in a wide range of applications.*



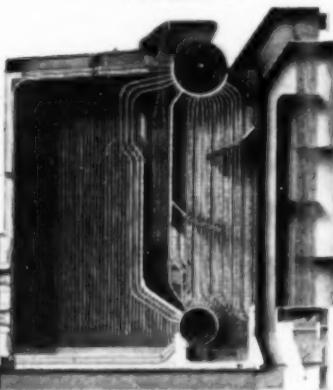
**C-E Package Boiler,  
Type VP**

4,000 to 40,000 lb steam per hr . . . pressures to 500 psi . . . for pressure firing of oil or gas . . . completely shop-assembled, needs only simple concrete slab for foundation. Has more water-cooled area per unit of furnace volume than any other boiler of its size and type. Large lower drum permits simple, symmetrical tube arrangement . . . great water storage capacity . . . easy access. Low-speed centrifugal fan is unusually quiet in operation. Simple baffle arrangement means low draft loss . . . simple soot blowing . . . no dead pockets . . . high heat absorption.



**C-E Vertical-Unit Boiler,  
Type VU-10**

10,000 to 60,000 lb steam per hr . . . pressures to 475 psi . . . superheat to 200 F in larger sizes . . . for coal, oil or gas . . . bottom-supported, needs no outside supporting steel. Boiler is efficient over a wide range of output, and is easy to operate and maintain. All parts are readily accessible for inspection. Regardless of fuel, the same general cross-sectional arrangement of drums, convection bank and furnace cooling is used. Uniform design through each transverse section assures even water level in drum, and uniform expansion.



**C-E Vertical-Unit Boiler,  
Type VU-55**

50,000 to 120,000 lb steam per hr . . . pressures of 250 or 500 psi . . . superheat and heat recovery equipment if desired . . . for oil or gas . . . bottom-supported, needs no outside supporting steel. This boiler is of symmetrical design. Thus gas temperature is constant across the full boiler width. The narrow, high furnace . . . integral design of boiler and preheater . . . absence of exterior ductwork . . . compactness—all help the VU-55 achieve standards of performance closely approaching that of large central station boilers.

## Other C-E Industrial Boilers

In addition to the standard boilers shown here, Combustion offers many other 2-drum designs, for capacities to 350,000 pounds of steam per hour, for any commercially available fuel, for pressures to 1375 psi, and temperatures to 960 F. Heat recovery equipment is available. So—whatever your steam needs—call Combustion for details on the complete line of C-E Industrial Boilers.

B-767A

## COMBUSTION ENGINEERING



Combustion Engineering Building  
200 Madison Avenue, New York 16, N. Y.

BOILERS, FUEL BURNING & RELATED EQUIPMENT; PULVERIZERS, AIR SEPARATORS & FLASH DRYING SYSTEMS; PRESSURE VESSELS; AUTOMATIC WATER HEATERS; SOIL PIPE

# Easily-Installed

**OTIS LIGHT DUTY ELECTRIC FREIGHT**



# For Light Freight

## ELEVATORS ARE SELF-SUPPORTING UNITS

You can have electric power freight handling at relatively low cost.

**Otis Self-Supporting Elevators** have been designed specifically for hoisting light freight between 2 or 3 floors. They are made in 3 standard sizes with lifting capacities of 1,500, 2,000 or 2,500 lbs. They travel at 25 feet a minute and are suitable for all rises up to 35'-0".



**Otis light duty elevators are self-supporting units. They keep all heavy loads off the building structure. They can be installed in any store, laundry, hospital, storage building, or manufacturing plant quickly and inexpensively.**

**NO COSTLY**  
...building reinforcing

The guide rail structure carries the

hoist ropes and sheaves, the elevator car, and the full freight load. Its vertical T-rails and cross channels transfer heavy vertical loads to the bottom of the pit.

The guide rail structure is attached to the building at each floor and at the top of the hoistway to steady the structure and take light horizontal thrusts.



**NO COSTLY... penthouse**

The supporting structure stops at the underside of the roof. Horizontally folding car gates reduce the hoistway headroom requirements above the top landing to 10'-6". Where extra headroom permits, standard vertical steel gates



may be used to leave the full door

width clear for loading.

This headroom permits the use of steel vertical bi-parting hoistway doors. They are constructed for long life under the rough handling encountered in freight service.

**NO COSTLY**  
...overhead supports

The hoisting machine is mounted as a complete unit on a concrete foundation at the bottom floor. It is powered by an Otis-built electric motor and operated by an Otis-built controller. The overhead hoist rope sheave is supported by the elevator structure.



\* \* \*

There's no need to delay a change to electric power freight handling. Write for Booklet B-720 or ask any of our 268 offices about Otis Self-Supporting Freight Elevators.

**Otis Elevator Company**  
**260 11th Ave., New York 1, N. Y.**



## FREIGHT ELEVATORS

**HEAVY DUTY • GENERAL DUTY • LIGHT DUTY**



## **"Here's where we can't go wrong," I told John**

John is my partner in a small manufacturing enterprise we started six years ago. Recently we decided to build a new plant that would give us added space and the most modern facilities. There were a lot of hard decisions to make because we just haven't enough money to afford mistakes, even little ones.

Then came the question of what fuel to use. The answer to this one was so easy, it was almost

a relief. Coal—for these reasons:

The cost of quality coal to meet our most exacting requirements should be substantially less than that of any other fuel.

With modern stoker and coal and ash handling equipment, our steam costs should be reduced to a minimum.

Not only can we store as much reserve coal as we require in our own yard safely and inexpensively, but there's no worry about

curtailment in delivery and diminishing supply, as could be the case with other fuels.

We figured, too, that if companies many times our size are burning coal—and for the same reasons—we can't go wrong.



### **Chesapeake and Ohio Railway**

*World's Largest Carrier of Bituminous Coal*

*Bring your fuel problems  
to C & O*

As the world's largest carrier of bituminous coal, the C&O is intimately familiar with every phase of coal use. We have a large staff of experts who will gladly help you to locate the coal best suited to your needs; to help you use it most efficiently; to help get it to you promptly.

*Write to:*  
Coal Traffic Department  
Chesapeake and Ohio Railway  
2112 Terminal Tower  
Cleveland 1, Ohio

# Get this **FREE** Water Softener Check-up!

**Find out just what kind of job your  
zeolite water softener is doing**

Never before has such a comprehensive zeolite water softener check-up service been offered—and without charge or obligation. Regardless of the age or make of your water softener equipment, you can have a thorough, technical SECA report (Softener Efficiency Cost Analysis) prepared by an Elgin-Refinite Engineer. It will be valuable now and for future planning.

Based upon your present operation, this report will show whether you are obtaining peak efficiency from your water softener. If not—

## **Report will tell you how to get . . .**

- More Soft Water Output
- Lower Salt Cost
- Fewer Regenerations
- Stepped Up Efficiency
- Other Dollar Savings

Either write, or use the coupon to put yourself in line for a SECA Report.



**This Certified  
Engineering Report —**  
is based upon nearly a half century  
of water conditioning experience.

### **ELGIN-REFINITE**

A DIVISION OF ELGIN SOFTENER CORPORATION  
132 N. GROVE AVE., ELGIN, ILLINOIS



*Water Conditioning since 1908*

ELGIN-REFINITE PRODUCTS INCLUDE SOFTENERS OF ALL  
TYPES, DEIONIZERS, DEALKALIZERS, DEAERATING HEAT-  
ERS, FILTERS, CHEMICAL TREATMENT, COMPLETE SYSTEMS.

**Mail Coupon Today**

! am interested in having a SECA Report (Softener Efficiency Cost Analysis) without cost or obligation.

NAME \_\_\_\_\_ POSITION \_\_\_\_\_

COMPANY \_\_\_\_\_

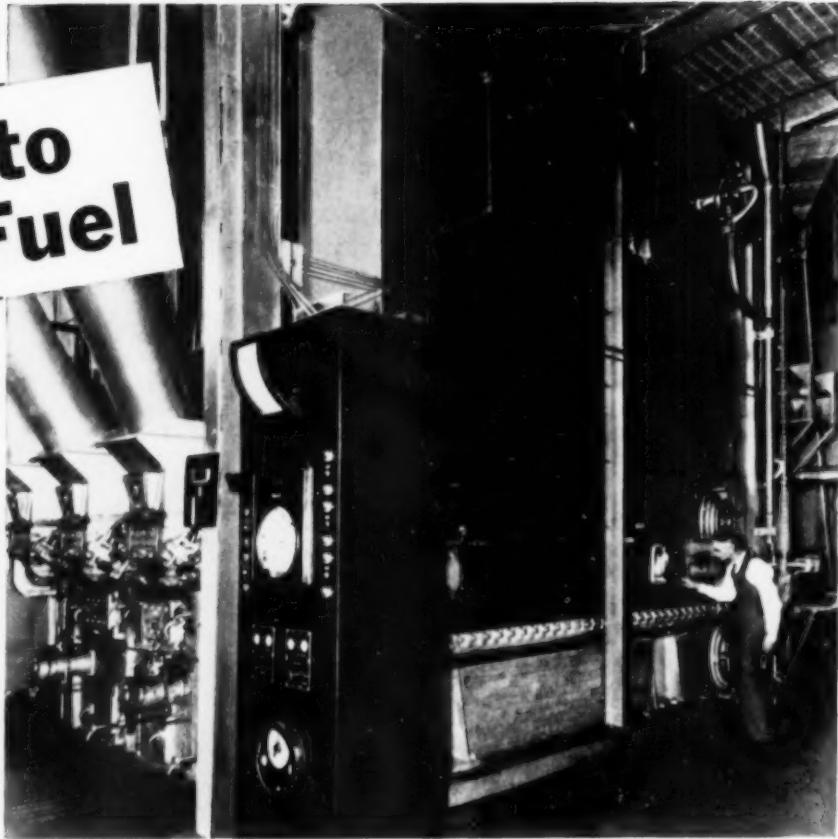
STREET AND NUMBER \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_

Mail to: Elgin-Refinite, Division of Elgin Softener Corporation, 132 N. Grove Ave., Elgin, Ill.

# How to Save Fuel

Fuel savings of 15% have resulted from steam plant modernization at General Mills, Inc., Buffalo, N. Y. The program included this installation of Bailey Meter Control on a 45,000 lb per hr, 170 psi spreader stoker-fired boiler.



• The heat energy you get from a unit of fuel depends on the performance of your steam plant equipment. And that's where Bailey controls can help. With a Bailey-engineered control system you can count on a higher output of available energy per unit of fuel. Here's why:

## 1. Suitable Equipment

When you receive equipment recommendations from a Bailey Engineer his selections come from a complete line of well-engineered and carefully tested products.

## 2. Seasoned Engineering Experience

Your local Bailey Engineer brings you seasoned en-

gineering experience based on thousands of successful installations involving problems in measurement, combustion, and automatic control.

## 3. Direct Sales-Service—close to you

For your convenience and to save time and travel expense there's a Bailey District Office or Resident Engineer in or close to your industrial community.

For greater fuel savings, less outage and safer working conditions, you owe it to yourself to investigate Bailey Controls. Ask a Bailey Engineer to arrange a visit to a nearby Bailey installation. We're glad to stand on our record.

A 121-1

**FORMULA**  
for Cutting  
Production Costs

+ Bailey Design  
+ Bailey Engineering  
+ Bailey Service  
= Greater Savings  
per Fuel Dollar

**BAILEY**  
METER COMPANY  
1028 IVANHOE ROAD  
CLEVELAND 10, OHIO  
*Complete Controls for Process Plants*

  
Controls for  
TEMPERATURE  
PRESSURE  
GAS ANALYSIS  
FLOW LEVEL  
RATIO

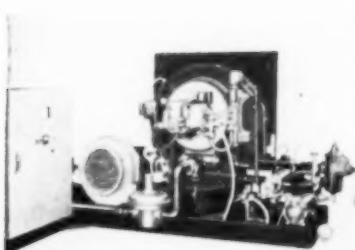
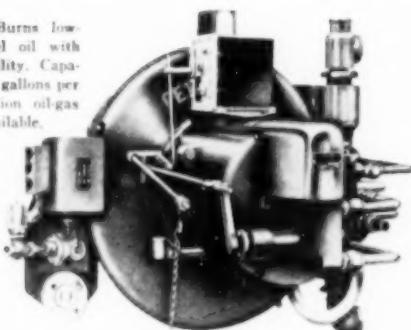
Is inefficient firing  
stealing dollars from  
your pocket?

install a

# PETRO INDUSTRIAL OIL BURNER

and  
save 3 ways

Rotary type. Burns low-cost heavy fuel oil with complete reliability. Capacities up to 200 gallons per hour. Combination oil-gas models also available.



Send for free catalog today . . .

see our catalog in  
S ARCHITECTURAL FILE  
or write for copy

#### 1. Fire low-cost oils

Petro fires the heavy fuel oils (Nos. 5 and 6) which average 8% richer in heat value than the light burner oils, and cost less per gallon.

#### 2. Save fuel and labor

They efficiently fire heavy oils with complete dependability, following load changes automatically. This makes fuel go farther and saves labor.

#### 3. Low maintenance cost

They are sturdily built and thoroughly reliable. This means low maintenance costs.

There's a Petro burner to fit almost every boiler, in sizes from 11 to 200 gallons per hour.

Heating contractors everywhere recommend and install Petro oil equipment. For illustrated catalog write Petro, 3034 West 106th Street, Cleveland 11, Ohio.

Residential Oil and Gas Burners, Oil and Gas Furnaces and Boilers  
Industrial and Commercial Oil, Gas and Oil-Gas  
Combination Burners

# PETRO

TM REG. U. S. PAT. OFF.

OVER 50 YEARS OF LEADERSHIP IN  
AUTOMATIC HEATING AND POWER EQUIPMENT



# RM POWER TRANSFORMERS

*the benefits of ASA standards*

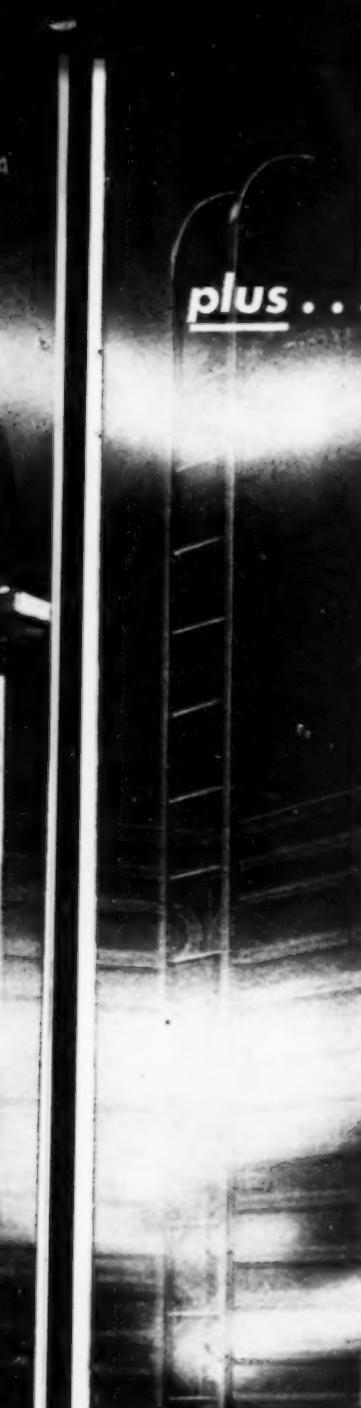
## RM\* brings you all these benefits

Repetitive Manufacture gives you the economy of a standardized product, yet with optional ratings and accessories sufficient to meet most special needs. Ordering is simpler, shipment is many weeks faster, and prices are up to 8% lower than those of non-standard units.

\*RM is the G-E designation for ASA-standardized power transformers 69 kv and below, 501 through 5000 kva single-phase, and through 10,000 kva three-phase.



LOWER PRICE



# plus . . . . . High dielectric strength

## from vapor-phase drying which removes entrapped moisture

When you need a transformer in the medium range, order a General Electric Repetitive-Manufacture transformer, and you'll get all the benefits of ASA standards plus many extra advantages that give you better performance, easier handling and less maintenance.

**HIGH DIELECTRIC STRENGTH**, for example, and better short-circuit protection are assured by an RM production technique called *vapor-phase drying*. Entrapped moisture, if left in the coil assemblies, would lower the dielectric strength of the insulation. Later this same moisture could seep out—causing shrinkage, loose windings, and a weakening in short-circuit stress resistance.

Vapor-phase drying removes the moisture which is present in the insulation during manufacture. At the new Medium Transformer Plant, all units rated above 15 kv and 2000 kva are given this unique treatment which uses vapor from boiling oil. As shown at left, the hot oil vapor permeates the windings and condenses on the coils releasing the latent heat of vaporization. It is this heat

which warms the windings and insulation to the point where, in combination with a high vacuum, moisture is driven out of the structure and carried away. These "pre shrunk" windings are then securely tightened into a compact coil stack which will remain tight in service giving maximum resistance to short-circuit stresses.

**MANY OTHER BENEFITS** result from the advanced methods and processes used in General Electric's new plant at Rome, Georgia. These include a stronger liquid-tight tank from submerged arc welding, superior rust prevention because new Super Melaglyp lasts up to 150% longer, quicker delivery from faster, conveyorized production. Built solely to produce power transformers in the medium transformer range, this plant serves utilities and industries by turning out better products in shorter time. You can get full information about RM power transformers by contacting your nearest G-E Apparatus Sales Office, or by writing for Bulletin GEA 6108 to General Electric Company, Section 422-11, Schenectady 5, New York.

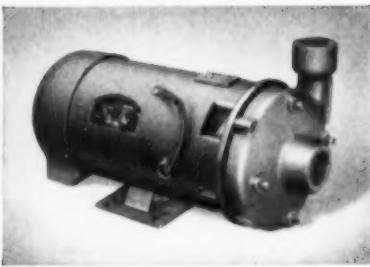
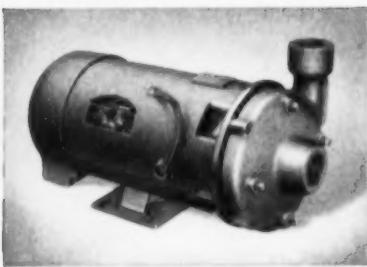
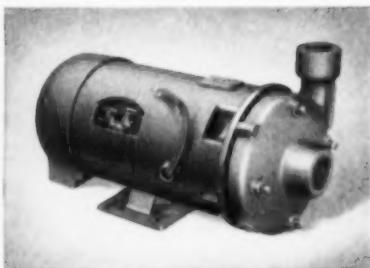
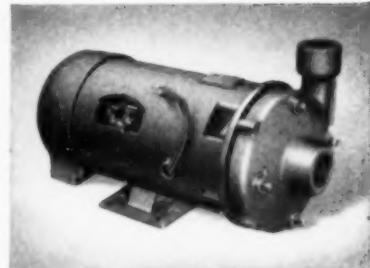
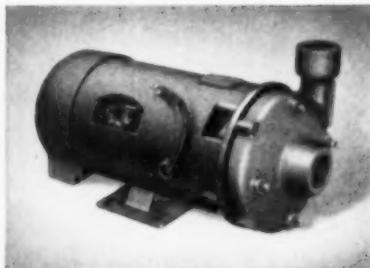
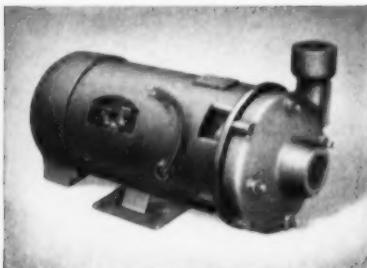
*Progress Is Our Most Important Product*

**GENERAL**  **ELECTRIC**



G.E.'s NEW ROME, GA., TRANSFORMER PLANT—built specifically to meet the growing trend to standardized power transformers.





## **but important in your air conditioning plans**

Here's a little circulating pump that can play an important part in home air conditioning systems. Built integrally with its own fractional horsepower motor, it delivers 20 to 30 gallons per minute at 50 p.s.i. It's comparatively new, but already

this Fairbanks-Morse Fig. 5552B Builttogether Pump has achieved wide acceptance, particularly as a circulating pump in home cooling towers. There are many other applications where this dependable, top-quality pump can be of service.

Why not check it for your needs. For complete information, see your local Fairbanks-Morse Branch, or write direct to Fairbanks, Morse & Co., the world's largest manufacturer of a complete pump line, 600 South Michigan Ave., Chicago 5, Ill.

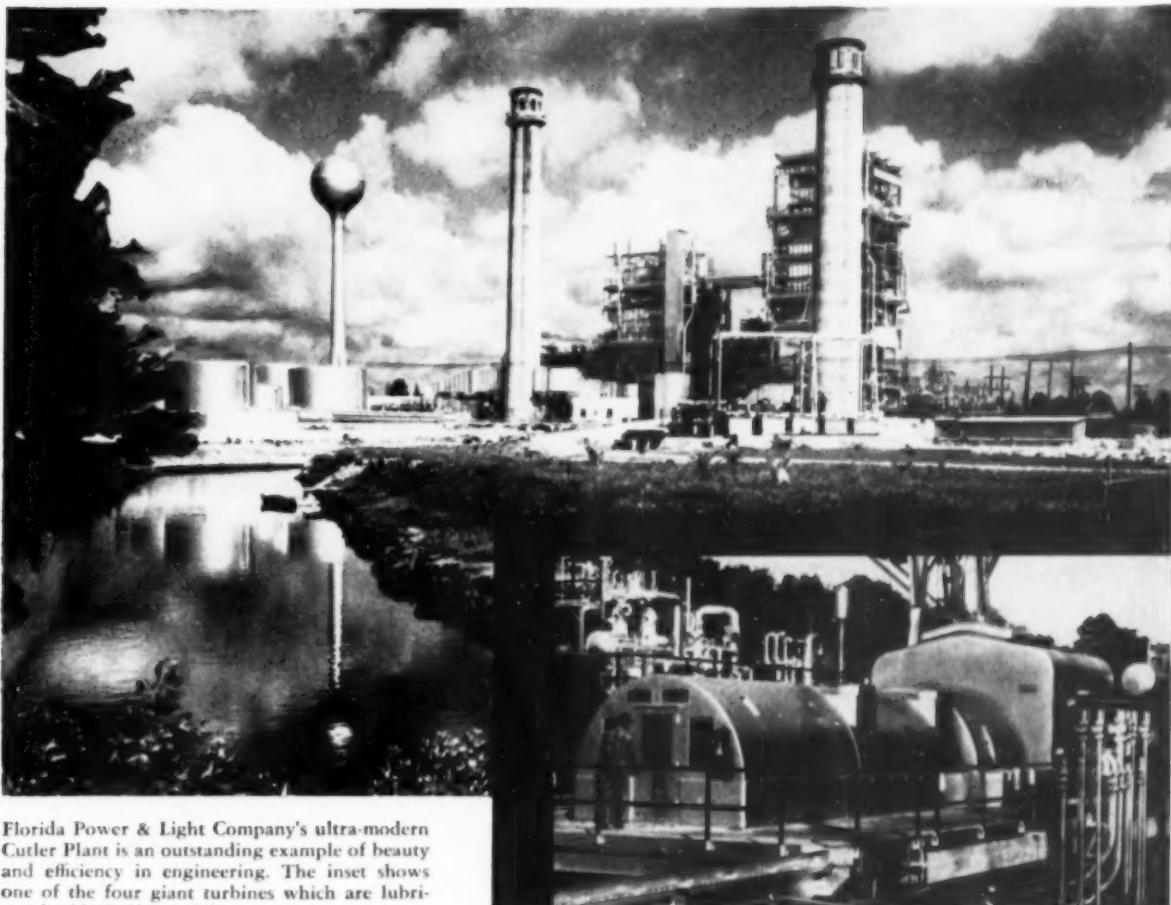


### **FAIRBANKS-MORSE**

*a name worth remembering when you want the best*

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

# Gulfcrest Oil selected for Florida's newest and largest power plant



Florida Power & Light Company's ultra-modern Cutler Plant is an outstanding example of beauty and efficiency in engineering. The inset shows one of the four giant turbines which are lubricated with Gulfcrest Oil.

Setting the pace for Florida's phenomenal economic growth is the Florida Power & Light Company which serves 452 thousand customers in the Sunshine State. Included in its current \$332 million expansion program is the giant new Cutler Plant—largest in the state.

The four huge generators (whose capacities total 160,000 kilowatts) and auxiliary equipment in the Cutler Plant are lubricated with Gulfcrest—the world's finest turbine oil.

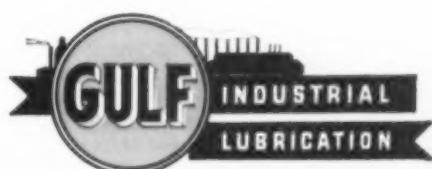
Gulfcrest Oil was not chosen at random for this important job. It has a background of superior performance in other Florida Power & Light Company plants, as well as in scores of other prominent utilities in Gulf's marketing territory.

In many installations Gulfcrest has been in service over 15 years without any significant

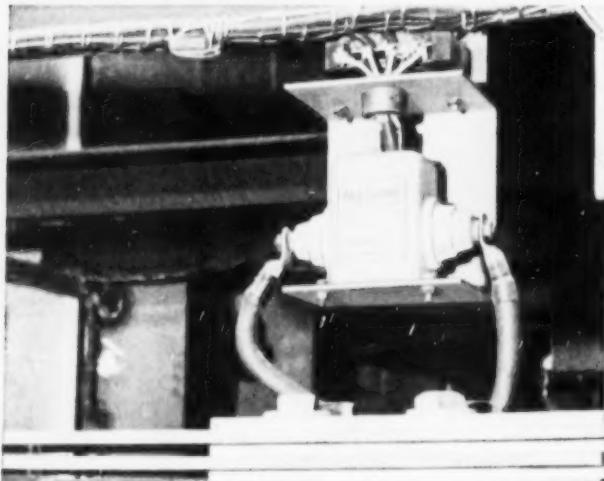
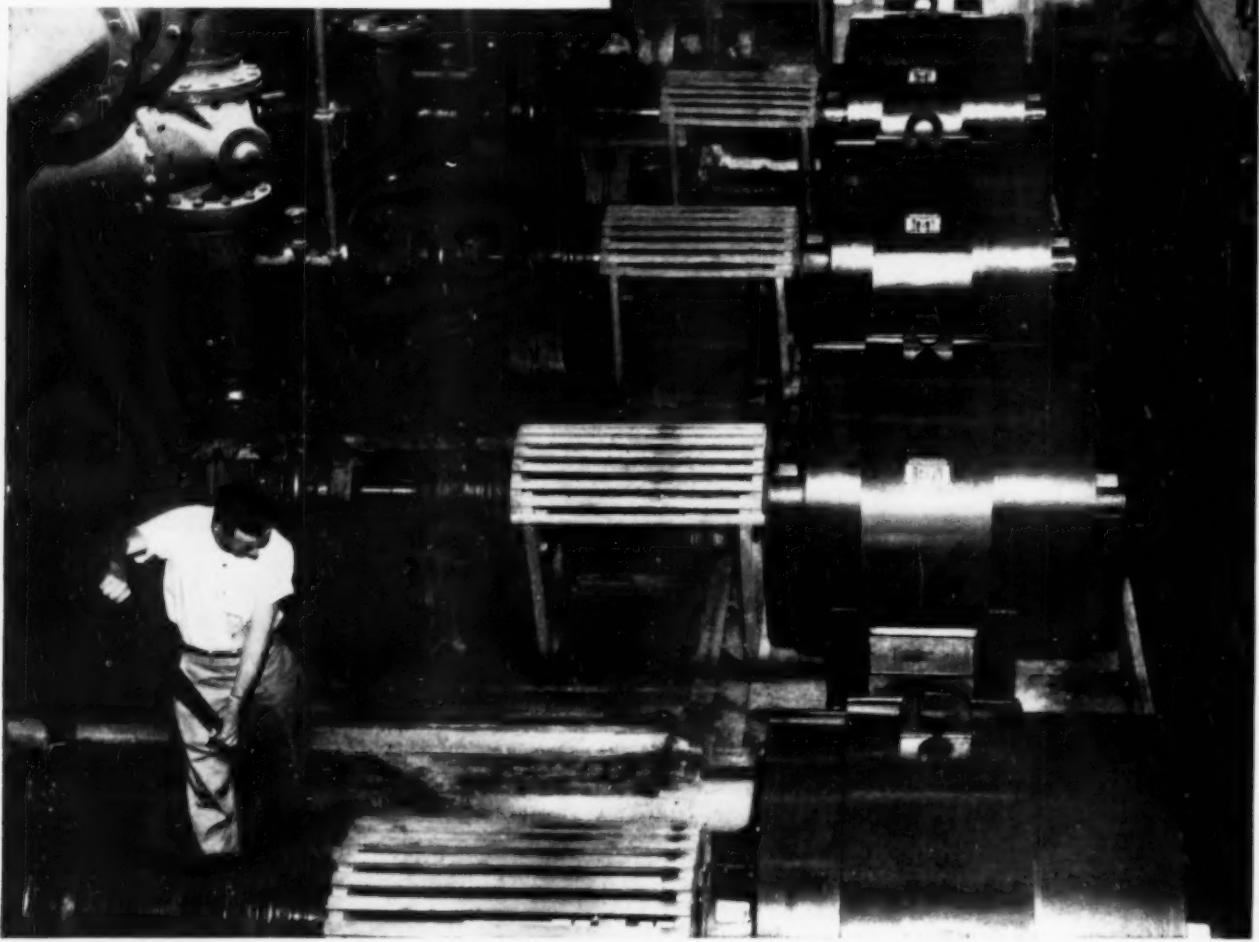
change in its original characteristics, and with neutralization numbers always remarkably low.

You'll be joining an impressive group of satisfied users when you fill your turbine system with this outstanding oil.

Your nearest Gulf office has a Gulf Sales Engineer always available to recommend the proper grade of Gulfcrest Oil for your turbine. Call him today, or write to the Gulf Oil Corporation, 1822 Gulf Building, Pittsburgh 30, Pa.



11 Westinghouse Synchronous Motors drive these Jordan machines at Hudson Pulp and Paper Co., Palatka, Florida. They provide constant speed needed for uniform fibrillation.



New Westinghouse Magamp provides a dependable check on a chlorine process line in a chemical plant. Whether used for control of tension, voltage, current or speed, Magamp acts swiftly, accurately. There are no moving parts to wear, no tubes to burn out.



Life-Line® Gearmotors drive a delivery roll on a slasher at this textile mill. In addition to basic efficiency, Life-Line compactness saves space and maintenance. The gear case is horizontally split for ready accessibility without disturbing oil or unit mounting.

# How Westinghouse products and services help power Southern industry

More and more is being produced in bigger and bigger plants. As the South's great industries grow, need for the *efficient* use of electric power increases with them.

Westinghouse has been able to offer a real measure of assistance in providing power components in the right combinations—for generation, distribution, utilization systems—helping not only to produce products physically, but to do it efficiently.

What is efficient power? It's produced with selected equipment that gets the right horse-

power or voltage where and when it's needed, according to demand cycle and other operating characteristics. At Hudson Pulp and Paper Co., Palatka, Fla., for example, is a proved record of boosted production with Westinghouse drives.

Your Westinghouse representative can assist you with any electrical problem in such industries as chemical, textile, paper or food processing. Working with him is a team of industry engineers, product engineers, research engineers. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-96027

YOU CAN BE **SURE**...IF IT'S  
**Westinghouse**



Westinghouse Renewal Parts Warehouses in your area help you keep low parts inventories on hand. Check the list at right for the service facilities nearest you.

## Westinghouse is organized to serve the South

**10 Apparatus Repair Shops** in Atlanta, Baltimore, Baton Rouge, Birmingham, Charlotte, Dallas, El Paso, Fort Worth, Houston, Huntington.

**13 Engineering Service Offices** in Atlanta, Baltimore, Beaumont, Charlotte, Dallas, El Paso, Houston, Huntington, Louisville, Memphis, New Orleans, Norfolk, Richmond.

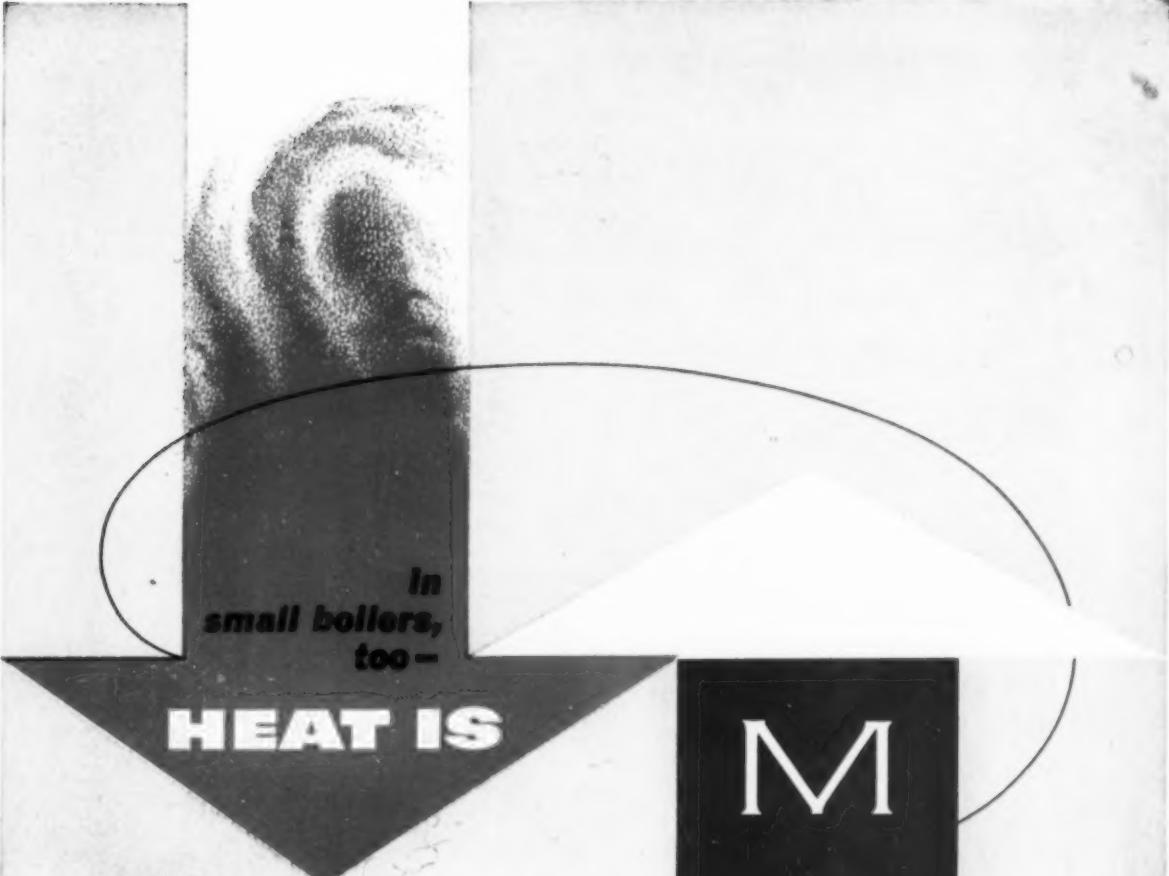
**8 Renewal Parts Warehouses** in Atlanta, Charlotte, Dallas, El Paso, Fairmont, Houston, Huntington, New Orleans.

# Cities Service cracks wise - and well...



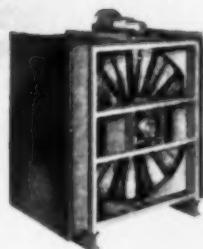
These three catalytic crackers dominate the skyline of our Lake Charles, Louisiana, refinery which normally processes 175,000 barrels of oil every day.

**CITIES  SERVICE**  
*A Growth Company*



In  
small boilers,  
too—

## HEAT IS



**Heat Recovery is Dollar Recovery.** Whether you use it to generate steam . . . or dissipate it up the stack — every BTU you generate costs you money. That's why, even on boilers with capacities as low as 25,000 pounds of steam per hour, it is most often economically right to do something about the waste heat. With the new *Packaged Ljungstrom Air Preheater*, you can apply to your small boilers the principles of heat recovery used by large utilities, where fuel efficiency is sought in every way possible. The Packaged Ljungstrom Air Preheater is a *continuous regenerative counterflow* unit. That is it transfers heat continuously from exit gas to incoming air streams by exposing heating surfaces on a slowly revolving rotor, alternately to both streams. It is highly efficient . . . low in cost . . . and fully reliable.

For more complete information, write today to *The Air Preheater Corporation*

**The Air Preheater Corporation**

60 East 42nd St. New York 17, N.Y.

**1248 Operating Cycles  
Through 24 Years  
Prove Quality Valve Buying**

... for main steam service, for instance

**The Installation**

At the Champion-International Paper Mill, Lawrence, Mass., featuring Crane 400-pound steel gate valve in main steam line to turbine. Working pressure: 400 psi at 600 deg. F.

**Valve Service Ratings**

**SUITABILITY:** Never a question

**FEATURES:** Quality throughout

**MAINTENANCE COST:** Not a cent

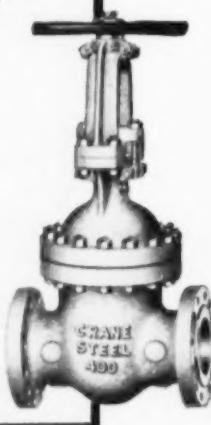
**SERVICE LIFE:** 24 yr.—still in line

**OPERATING RESULT:** Lower power costs

**AVAILABILITY:** Regular Crane Catalog item

**The Valve**

Improved constantly through the years, Crane steel valves for elevated pressures and temperatures are known and respected everywhere for outstanding, low-cost performance. They're made in the widest range of body and trim materials—in all pressure classes and sizes—with screwed, flanged, or welding ends. See your Crane Catalog, or consult your Crane Representative.

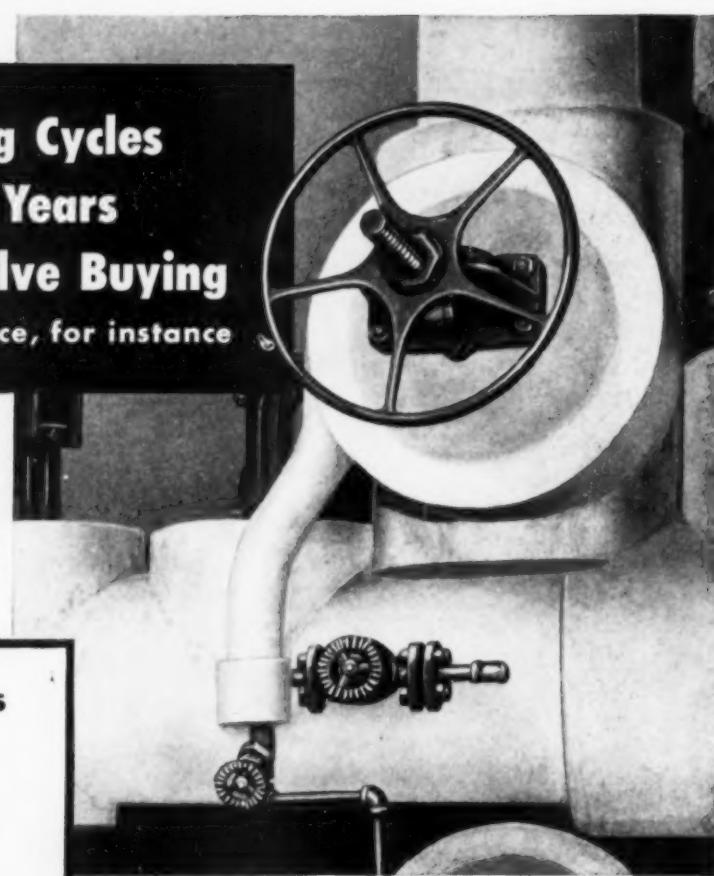


THE BETTER QUALITY . . . BIGGER VALUE LINE . . . IN BRASS, IRON, STEEL

**CRANE VALVES**

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Illinois  
Branches and Wholesalers Serving All Industrial Areas

**VALVES • FITTINGS • PIPE • PLUMBING • HEATING**



**The Case History**

Installed in 1930, this Crane valve has been in continuous use ever since. In 24 years the valve has not required service or maintenance of any kind.

More significant is the quality of performance of this 8-in. steel gate valve. Operated for week-end shutdown of the turbine, it has never failed to respond to the handwheel with smooth, steady action. Both seating and stem seal remain as tight as when the valve was first installed.

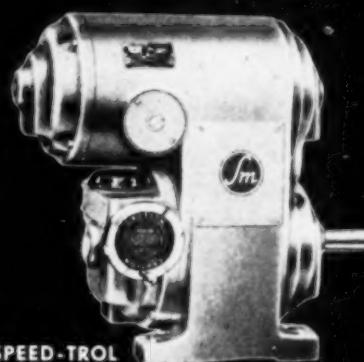
Performance like this begins in just one way—by making quality the first consideration when buying valves. Today, such a buying policy is sounder than ever and Crane quality, more than ever, helps assure the best results at lowest ultimate cost.



**STERLING ELECTRIC POWER DRIVES**  
**ENGINEERED TO YOUR REQUIREMENTS**

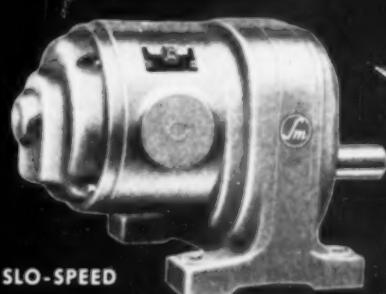
*For the  
Best* ★★★★

★ VARIABLE SPEED



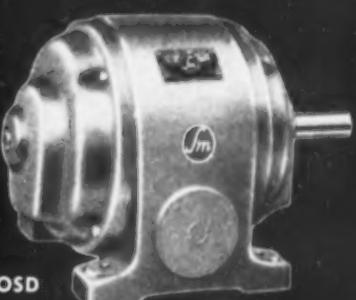
SPEED-TROL

★ LOW SPEED



SLO-SPEED

★ CONSTANT NORMAL SPEED



KLOSD



20-page illustrated catalog  
Sterling Speed-Trol, Slo-Speed,  
Kload and Kload-Tite  
Electric Power Drives. Write  
for catalog No. 574.

**STERLING** ELECTRIC MOTORS

Plants: New York City 51 • Van Wert, Ohio • Los Angeles 22 • Hamilton, Canada • Santiago, Chile

Offices and distributors in all principal cities.

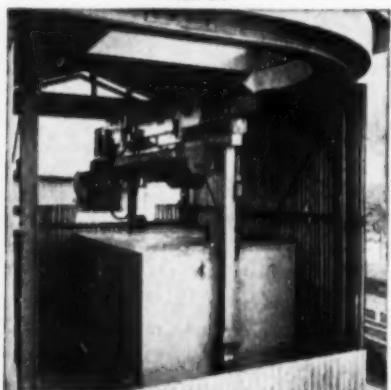
# AUTOMATIC

# "UP AND OVER"

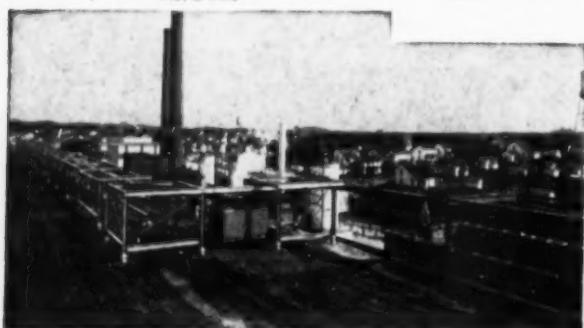
# TRANSFER



Three boxes—450 lbs. each—are loaded in car. When doors are closed the car raises to carrier.



When car reaches upper limit, the Mono-Tractor propels carrier on the MonoRail to No. 2 mill.



Carrier travels at 50 f.p.m. around curves—150 f.p.m. on straight track with slow approach at towers.

## SAVES \$30,000 PER YEAR

Here is an "Up-and-Over" system that eliminates 72 hours of handling labor per day. It automatically transfers 180 full bobbin boxes from three floors of one mill to one floor of another and returns the empties. Estimated savings in labor, trucks, floors and traffic congestion run upwards of \$30,000 per year.

It is another of the many examples of American Mono-Rail engineering for low-cost handling within space limitation. Let one of our field representatives explain further the versatility and low maintenance of American Mono-Rail equipment.

### \*\*"UP-AND-OVER"

is the title of our 16-mm. sound film showing how MonoRail solves many tough handling problems. Please allow us three weeks to schedule showing.

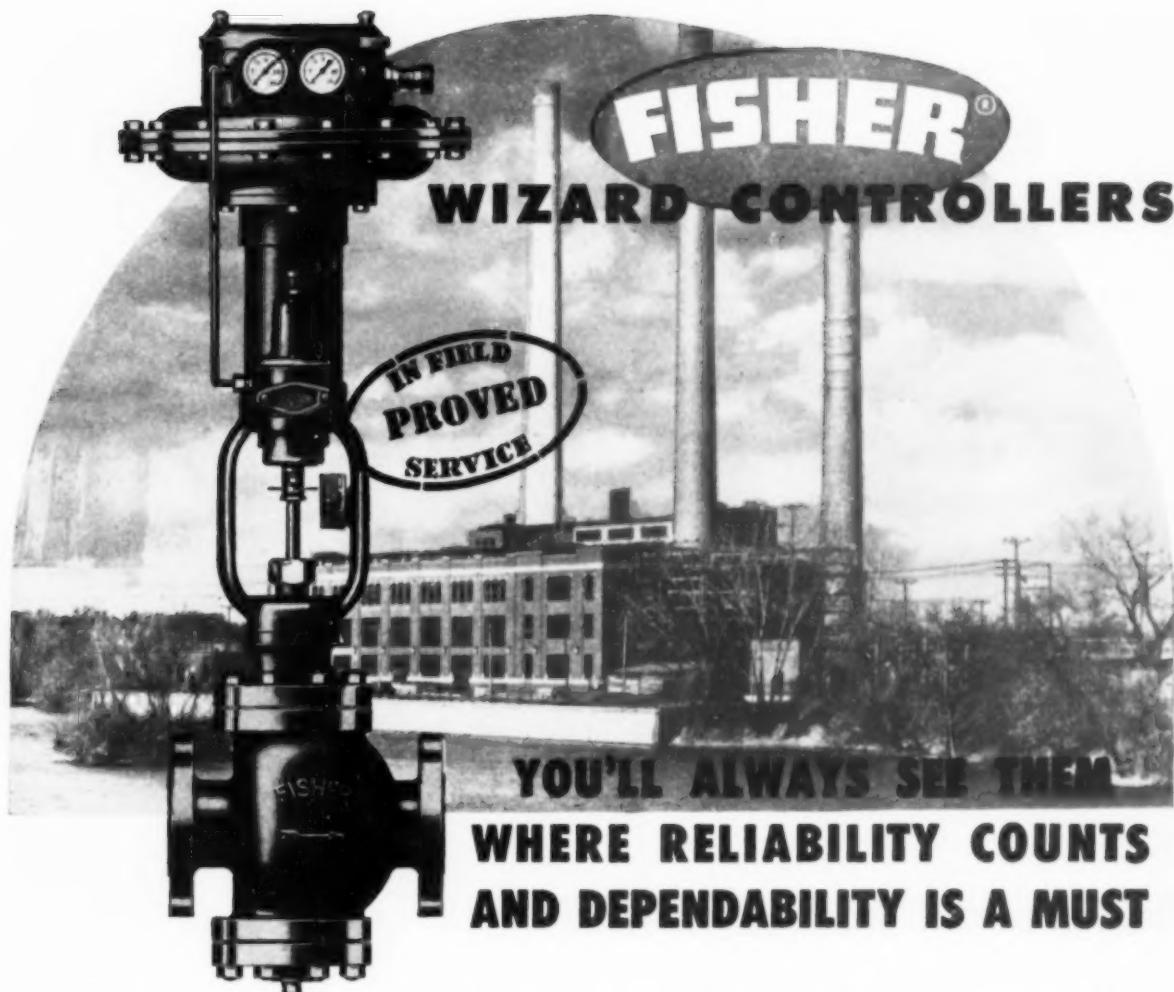


# AMERICAN MONORAIL COMPANY

13105 ATHENS AVENUE • CLEVELAND 7, OHIO



At No. 2 mill car lowers to third floor for delivery of full boxes and return dispatch of empties.



The ingenious, simply-designed mechanism of Fisher Wizard Controllers provides extreme accuracy and dependability in pressure control.

Fisher Wizard Controllers will completely solve your pressure control problems. They are individually built to meet your exact operating conditions, and are guaranteed to give satisfactory performance.

High pressure Fisher Wizards are available in throttling and snap acting types. Bourdon Tube pressures from 5 to 5,000 P.S.I. Diaphragm or remote panel mounting.

Low pressure Fisher Wizards available in diaphragm or remote panel mounting. Bellows pressures from  $\frac{1}{2}$  to 15 P.S.I.

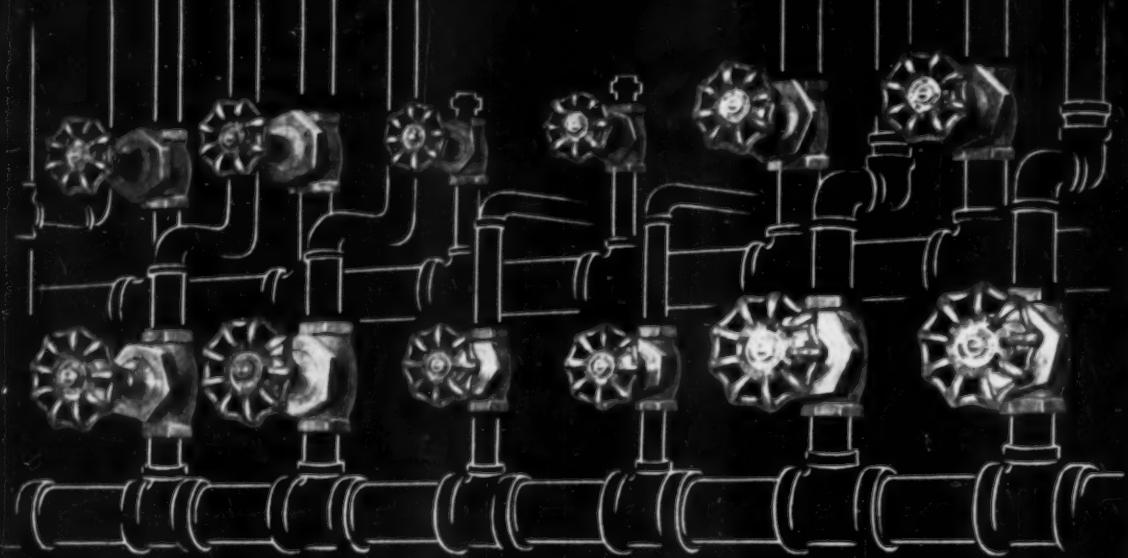
FISHER LEADS THE INDUSTRY IN RESEARCH  
FOR BETTER PRESSURE CONTROL



**FISHER GOVERNOR COMPANY**

Marshalltown, Iowa

# WALWORTH



## BRONZE VALVES

*Better because . . .* Walworth has standardized its line of bronze valves to provide an unsurpassed system of interchangeability of parts for assembly or replacement. You can maintain a great number of Walworth Bronze Valves with a small inventory of basic parts . . . you minimize part replacement problems. For further information, ask us for our Bronze Valve Standardization Chart.

Choose from complete lines of Walworth Bronze Valves — including gate, globe, angle, check, and lubricated plug types. Walseal® Bronze Valves and Fittings are also available for making silver-brazed joints.

For full information on Walworth Bronze Valves and Fittings, call your Walworth Distributor, nearest Walworth Sales Office, or write to Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.



Parts are carefully machined and finished to close tolerances, thereby assuring accurate fit and alignment under all conditions. Sectioned valve is Walworth No. 225P Bronze Globe Valve with stainless steel plug-type seat and disc, heat-treated to a minimum of 500 Brinell hardness.

# WALWORTH

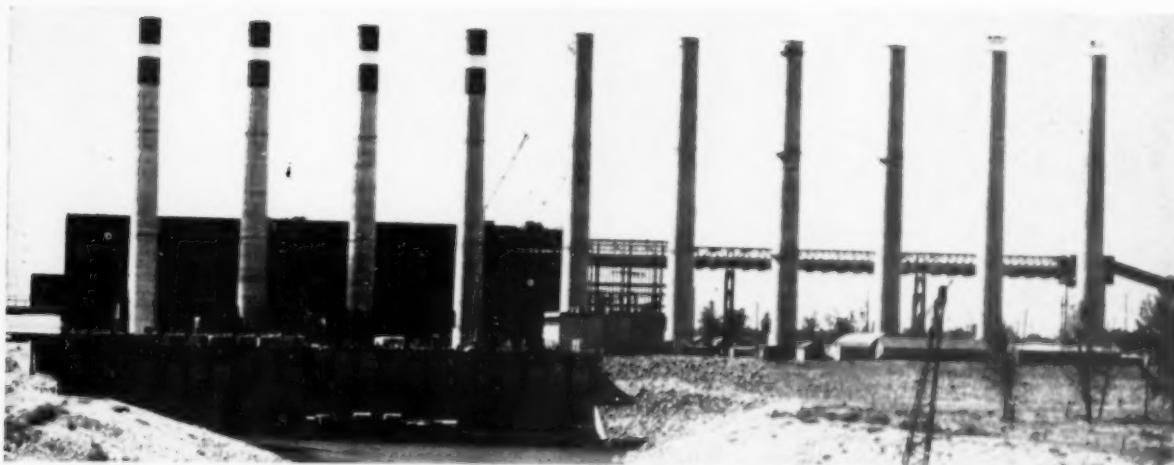
Manufacturers since 1842  
valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

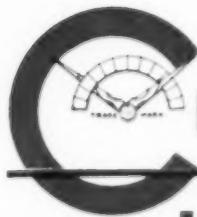
SOUTHERN POWER & INDUSTRY for NOVEMBER, 1954

# Like All Valuable Property Your Chimney Needs Care



Custodis Construction Company, Inc., built for the Tennessee Valley Authority at the Shawnee Steam Plant near Paducah, Kentucky, ten reinforced concrete chimneys 299' x 14' including foundations with independent linings of perforated radial brick.

ANY job, large or small, receives the careful attention and benefit of Custodis' long experience, sound engineering, expert supervision and skillful workmanship. Custodis excels in this work—a sparkling example is TVA's Shawnee Steam Plant pictured above—and you profit from their more than 50 years of stack experience. Whether your chimney is of brick, steel or concrete, a systematic maintenance plan can be money in the bank for you. Turn to the expert engineers and inspectors of Custodis, skilled in all phases of this highly specialized work. If the chimneys in your plant are cracked or corroded, stop this operating liability with a call to Custodis.



## CUSTODIS CONSTRUCTION COMPANY, INC.

■ ATLANTA

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WA 1183

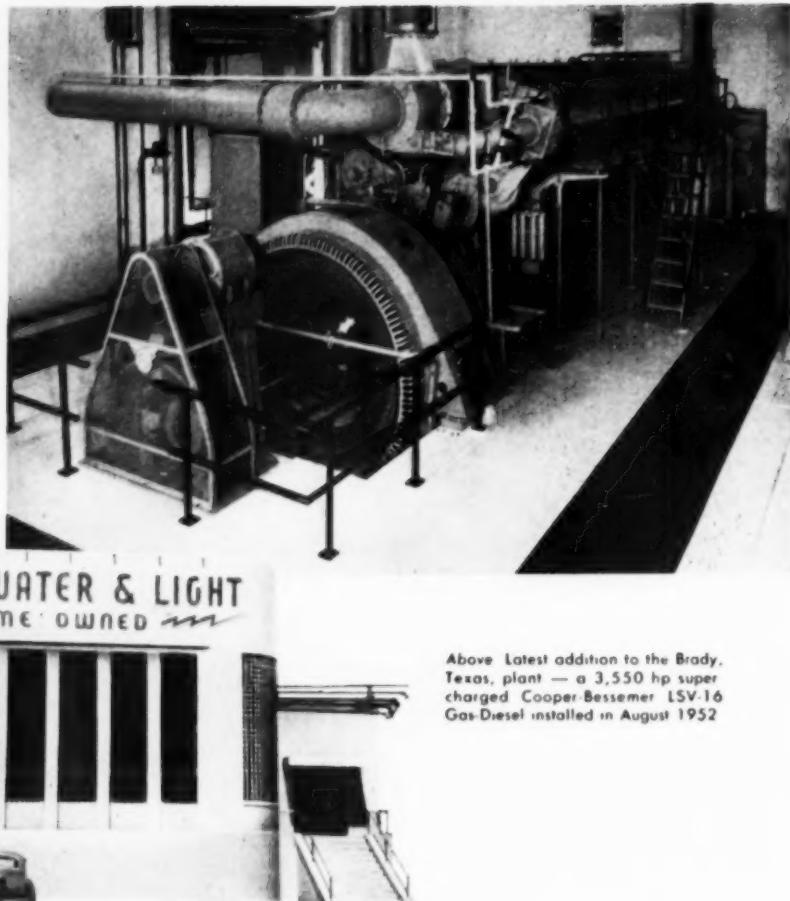
■ NEW YORK

157 Chambers St.  
DI 9-3944

■ CHICAGO

22 West Monroe St.  
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Another Example  
of  
Efficient Power  
at Lower Cost



Above: Latest addition to the Brady, Texas, plant — a 3,550 hp super charged Cooper-Bessemer LSV-16 Gas-Diesel installed in August 1952

## BRADY'S GREATEST PUBLIC BEFECTOR ... a Cooper-Bessemer-powered municipal plant

TO say that the home-owned water and light plant at Brady, Texas, is a public benefactor is putting it mildly! Since 1942 this plant has advanced to this city of 7,000 more than \$600,000 for civic improvements, *plus* service donations exceeding \$200,000. It has helped keep taxes very low while defraying the costs of fire fighting equipment, police protection, street lighting, a new "whiteway" system, power for churches and schools at half cost, road improvements, 20 miles of new pavement and various recreation facilities including a swimming pool.

The Brady plant, like so many other efficient municipal plants, is powered with modern Cooper-Bessemer Gas-Diesels, assuring the highest thermal efficiencies known. Brady's latest is a big 3,550 hp supercharged unit installed in August last year. Because of its high efficiency it is kept in virtually 24-hour operation . . . 5205 hours through March 20, producing

7,325,000 kwh. The remainder of Brady's power is supplied by two older tandem-connected Cooper-Bessemers almost as efficient.

To make the most of your power plans for the future, be sure to check on the distinct advantages you stand to gain with modern Cooper-Bessemers.

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**COOPER-BESSEMER**  
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**SINGLE  
SEAT VALVES  
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**BLINYAN** SERIES  
**DOMOTOR VALVES**

**Body Sizes** . . . 6"-8"-10"

**Body Design** . . . Globe, angle and 3-way. Tight shut-off, single-seat body. Standard, Cooling Fin or Doolesal bonnet.

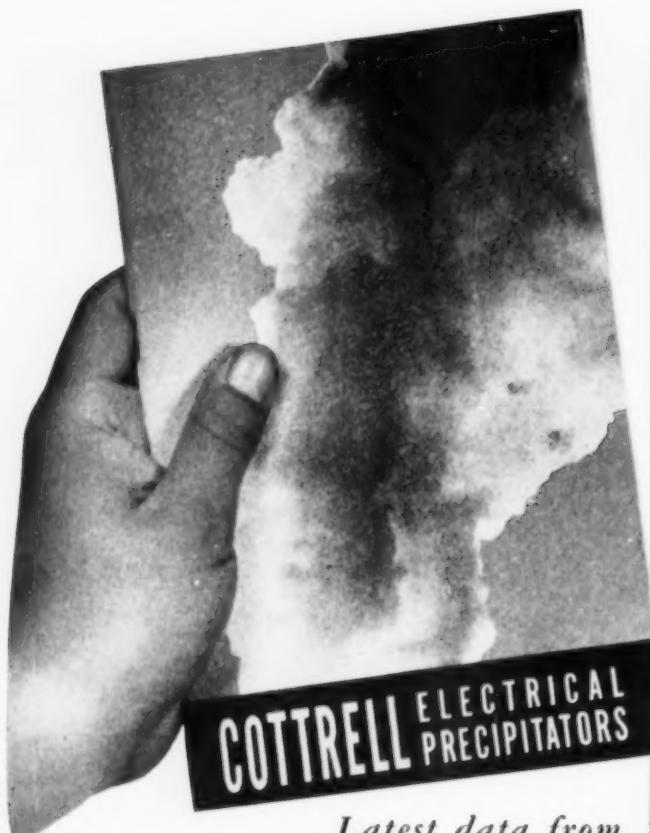
**Body Ratings** . . . Standard ASA 300, 600, 900, 1500, and 2500 PSI.

**Operators** . . . Domotor, cylinder and handwheel. Domotor operators for all pressures and pressure drops. Piston sizes of 200 and 400 sq. in. for thrusts up to 40,000 lbs. Domotor or Cylinder strokes to 6" as required.

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**ANNIN**  
*Control VALVES*



*Latest data from  
Western Precipitation  
on Cottrell Recovery Equipment*

Do you have operations in your plant where gas-laden suspensions, wet or dry, are a problem? Such suspensions may be dropping on surrounding property, causing nuisance difficulties.

Or perhaps important values are being lost in stack gases that can be profitably recovered. Whatever the nature of your recovery requirements, you will find this 40-page Cottrell booklet of great help. It contains up-to-date data on the latest advancements in the electrical precipitation field — prepared by the organization that pioneered the commercial application of Cottrell Electrical Precipitators almost a half century ago and has consistently led in new Cottrell developments.

A copy of this data-packed booklet will be sent free to engineers and other executives interested in recovery processes. Send your request to our nearest office.

For nearly 50 years Western Precipitation has carried on a continuous research and development program on Cottrell Electrical Precipitators, Multiclonal Mechanical Collectors and other types of recovery equipment. We are not affiliated with any other company in the electrical precipitation field except our wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. We are equipped to serve you anywhere in the United States, Canada, and throughout the world!

## 40 PAGES of helpful information

on Recovering Dusts, Fly Ash,  
Mists, Fumes and other Sus-  
pensions from Gases.

*This booklet summarizes  
the important points design and plant engineers  
should know about Cottrell Precipitators . . .*



- Basic types of Cottrell equipment.
- Principal elements in a Cottrell unit.
- Data on Mechanical and Electronic Rectifiers.
- Various types of Collecting Electrodes (rod curtains, corrugated plates, pocket electrodes, etc.).
- Typical ways of removing collected material.
- Various Shell Constructions (steel, concrete, brick, etc.).
- The effect of various factors on efficiency and performance.
- Data on CMP (Combination Multiclonal-Precipitator) Units.

. . . and many other helpful facts on Cottrell design and operation.

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The reason? SPANG CW Steel Pipe is uniform in every respect . . . a result of quality-controlled manufacturing.

**—SPANG CW has strong,  
uniform welds**

During the forming and welding of SPANG Pipe, automatic heat control eliminates temperature deviations. This produces highest quality welds

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Finished pipe is carefully sized and straightened to assure uniformity. Careful testing and inspection eliminates any CW Pipe that does not come up to SPANG's high standard.

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is easy to work with . . . easy to cut, bend, thread and weld. It saves you time on the job . . . gives you faster installations . . . saves you money, too!

SPANG CW Steel Pipe is tops for plumbing, heating, air conditioning, radiant heating and snow-melting systems. Call your nearest SPANG Distributor for complete information on SPANG CW Steel Pipe. Try it on your next job!



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DIVISION OF THE NATIONAL SUPPLY COMPANY

General Sales Office: Pittsburgh 30, Pa. District Sales Offices: Atlanta, Boston, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis



*"You see Powell Valves everywhere! And with . . .*

*. . . good reason! They're famous for dependability. Economical, too. What's more, Powell has a complete line."*

## Famous for dependability

**SINCE 1846**

Wherever flow requires dependable control, there's *the* place for Powell Valves. Powell probably makes more kinds of valves and has solved more valve problems than any other organization in the world.

Available through distributors in principal cities. Made  $\frac{1}{8}$ " to 30" and for 125 pounds to 2500 pounds W.S.P. Bronze, iron, steel and corrosion-resistant metals and alloys. On problems, write direct to The Wm. Powell Company, Cincinnati 22, Ohio.



**CONTROLS FOR THE LIFE LINES OF INDUSTRY**

# Powell Valves

**108th  
year**



CARBON BLACK TAPES in ANACONDA Type CB Cable keep deterioration products outside dielectric field . . . lengthen cable life.

## "Hungry" tapes add life to this cable

Colloidal carbon can purify and stabilize many fluid mixtures—a property important to chemists. It's important, too, to cable engineers. For it can do the same for impregnating oil in paper cables. At Anaconda, tests with cables made with carbon-black tapes proved it!

These tapes are "hungry" for oil-deterioration products created by high heat and electrical stress. They stop ionization discharges. They keep insulating oil "alive." The life span of ANACONDA Type CB\* (Carbon Black) Power Cable greatly exceeds that of ordinary impregnated paper-insulated

cable. Type CB cables in service over 13 years have proved their superiority.

For greatly extended sheath life of ANACONDA Type CB Cable, specify ANACONDA F-3\*\* alloy. This superior alloy-lead sheath won't age-harden . . . resists slow-bending fatigue, creep, burst and abrasion. Cable joint sleeves also are available in this same alloy. They all offer higher tensile strength, a 50% higher bursting strength than copper-lead, lower creep rate and similar increased resistance to bending fatigue and vibration.

For the full story on this superior,

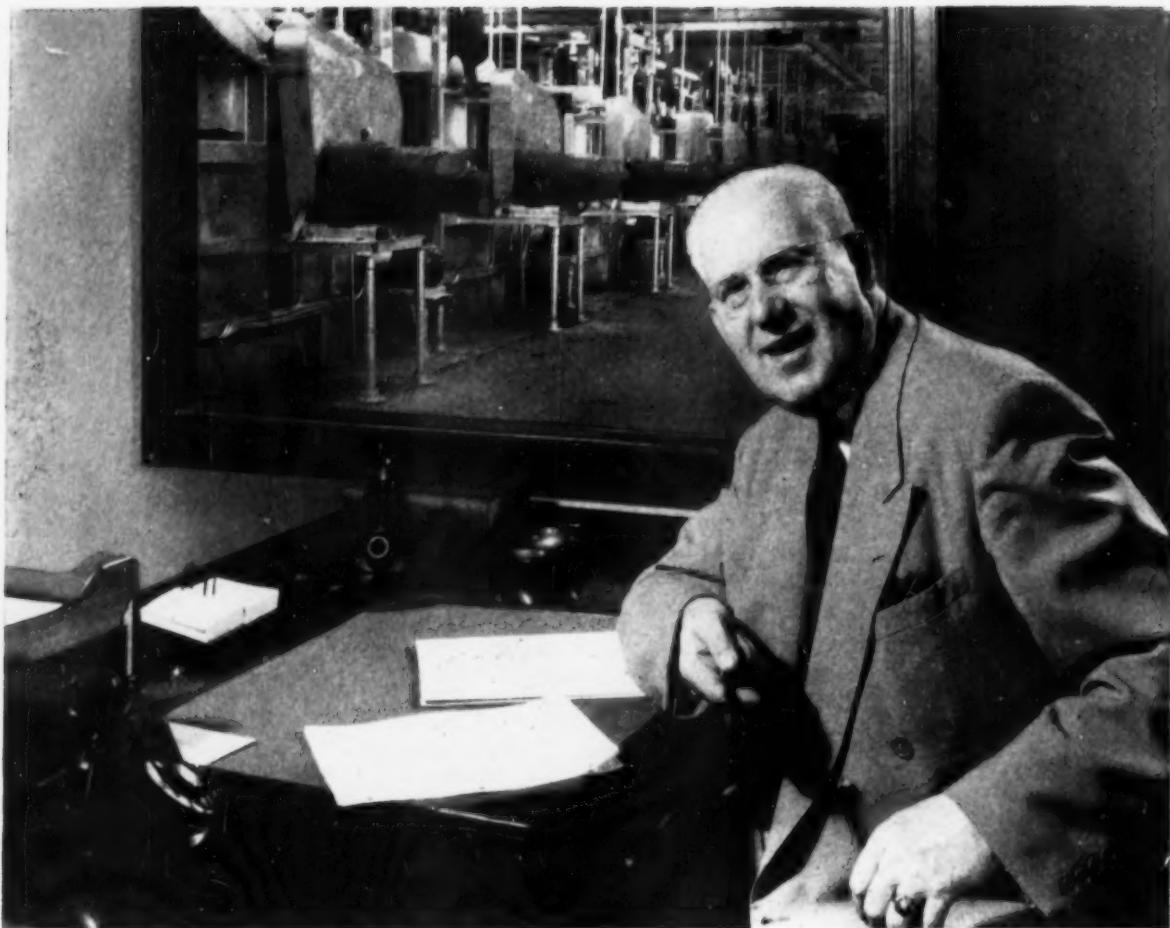
time-tested cable, see your Anaconda Representative. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

\*CB — Carbon Black (U. S. Patents 2,102,129, 2,405,853) Reg. U. S. Pat. Off.

\*\*F-3 — Arsenic Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

### ANACONDA®

*Service and overhead distribution cables, bare and weatherproof, including ACSR • signal, control and communication cable • portable cords and cables • network cables • airport and series lighting cables • mine cables • magnet wire • copper, aluminum and copper-clad conductors • wire and cable accessories.*



## "We Simplified Ordering, Speeded Servicing When We Specified Life-Line Gearmotors"

"We ended round-robin chases to various suppliers whenever speed-reduction equipment is needed. By using Life-Line\* Gearmotors we place only one call to one manufacturer...Westinghouse. Our ordering procedure has been greatly simplified, for no other supplier need be contacted to complete our speed-reduction package.

"For servicing, too, we know just where to turn. Every component of Life-Line Gearmotors is made and serviced by Westinghouse. We've learned through experience that *one* call to Westinghouse brings prompt and expert attention for our entire drive equipment. Down time has been

reduced which means a real saving for us."

### **Life-Line Gearmotors Mean Westinghouse Service**

Every Life-Line Gearmotor is backed by a nationwide service organization, a ready supply of gearmotor parts, complete repair facilities conveniently located and a staff of field engineers ready for consultation on any of your drive problems.

Your local Westinghouse representative will be glad to give you full details. Call him at any time or write: Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa. J-07333

\*Trade-Mark

YOU CAN BE **SURE**...IF IT'S  
**Westinghouse**



here's how  
high temperature  
piping  
can flex  
its muscles



Each pipe hanger is scale tested to rigid tolerances by a skilled workman at the Navco plant. After final assembly and inspection, the hangers are carefully crated and readied for shipment.

# NAVCO Counterpoise Pipe Hangers

Since high temperature piping has no respect for equipment connections, the entire piping system must flex its muscles to absorb the strain of expansion and contraction. This prevents serious stresses that could endanger the installation.

And how does high temperature piping flex its muscles? With Navco's precision engineered Counterpoise Pipe Hanger—the hanger with a load-supporting effort that is of constant value throughout the range of travel. This permits weightless movement of the entire piping system.

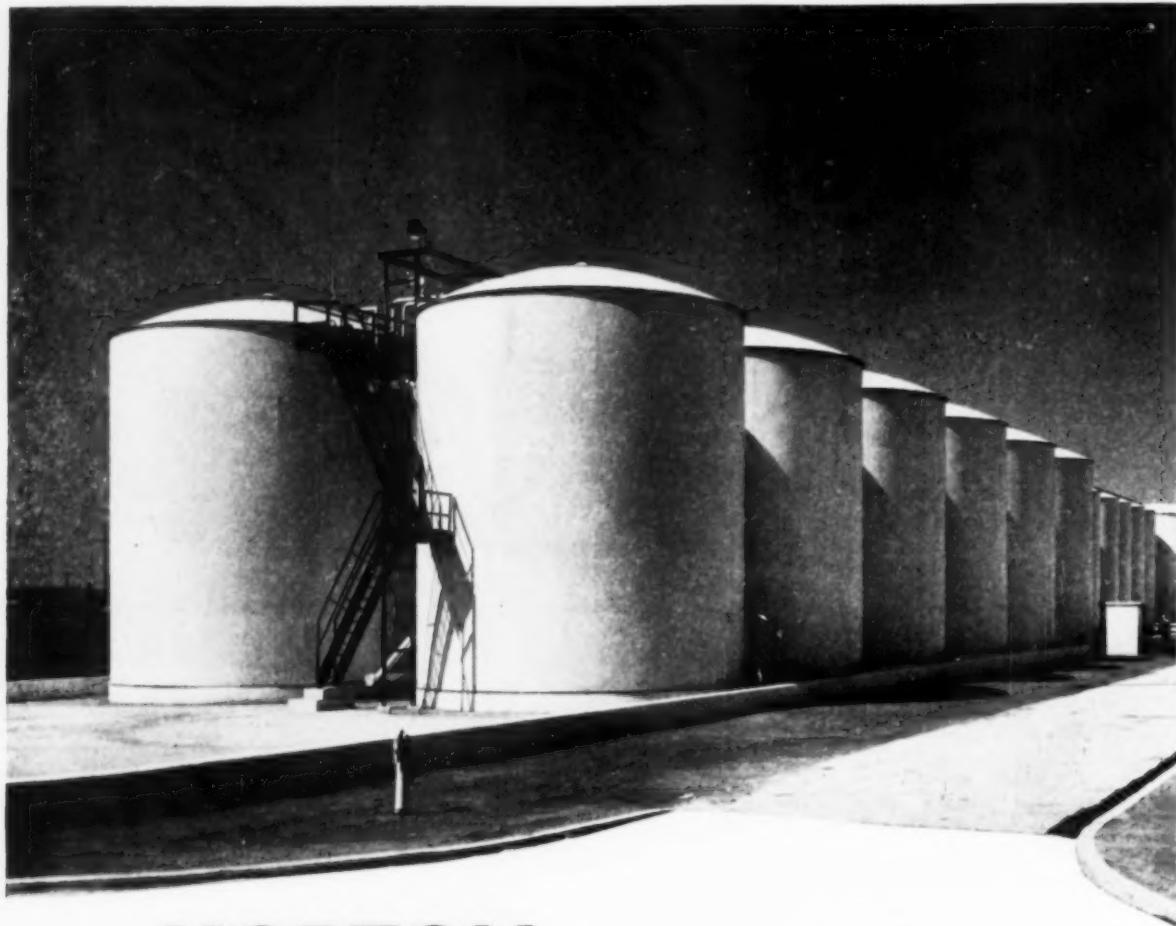
To learn how power plants, oil refineries and chemical plants can have piping systems that flex their muscles, write today for Navco's 12-page Counterpoise hanger bulletin #153.



## NATIONAL VALVE & MANUFACTURING COMPANY

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# ANIMAL, MINERAL OR VEGETABLE . . .



## IT'S HORTON TANKS FOR OIL STORAGE

Chicago Bridge & Iron Company's engineering, fabricating and construction departments are equipped to build welded steel plate tanks of any size, shape or form to store animal, mineral or vegetable oil . . . or any other liquid.

Special construction and exacting specifications offer no obstacles. We have complete facilities for erecting structures built of carbon steel or non-corrosive metals and for stress-relieving and X-rayed shop-built structures. All of our four plants are equipped to pickle and paint steel plates and shapes by the Horton phosphoric acid process.

When planning flat-bottom storage tanks, elevated water tanks, standpipes, or any type of welded steel plate work, write our nearest office for information, estimates or quotations. There is no obligation on your part.

*The view above shows some of the 42 tanks we built for the Southern Cotton Oil Company in Chicago, Illinois. Used to store vegetable oil, they are typical examples of welded, easily maintained Horton® steel tanks.*

## CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2180 Healey Bldg.  
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Detroit 26.....1534 Lafayette Bldg.  
Houston 2.....2132 C & I Life Bldg.  
Los Angeles 17.....1545 General Petroleum Bldg.  
New York 6.....3312-165 Broadway Bldg.  
Philadelphia 3.....1646-1700 Walnut St. Bldg.

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**PROCESS  
CHANGES  
CAN'T OBSOLETE  
THIS TRANSMITTER . . .**



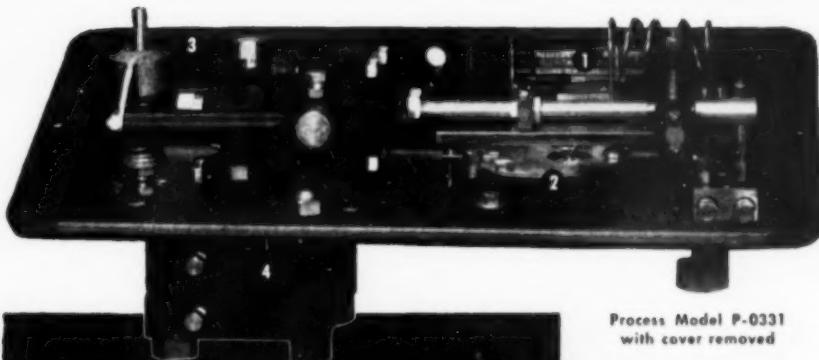
**① 10-1 RANGE CHANGE  
—NO CHANGE OF PARTS**

Double weighbeam construction on many models permits range changes as much as 10-1, just by turning a set of locking nuts to change a fulcrum point.

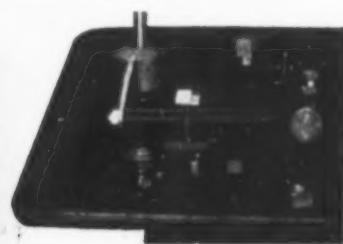


**② ADDITIONAL 16-1 RANGE  
CHANGE—STILL NO PARTS  
CHANGE**

Range may be changed on all models by loosening retaining bolts and sliding the reaction chamber to a new leverage position. Reaction area may be changed for further range change.



Process Model P-0331  
with cover removed



**③ SUPPRESS, COMPOUND  
OR REVERSE RANGES**

Balancing spring, installed to exert either an upward or downward force on transmitter weighbeam, quickly converts transmitter for range suppressions up to 80% of total range, for reversed ranges or for compound ranges where pressure fluctuates above and below atmospheric pressure.



**④ MAJOR RANGE CHANGES**

Range change plates may be easily inserted or removed from measuring chamber to change the effective diaphragm area for major range changes. Similar plates may be used also in the reaction chamber for further range change.

**REPUBLIC** PNEUMATIC  
TRANSMITTER  
with  
**EASY RANGE CHANGE**

Here's the pneumatic transmitter for measuring differential, flow, pressure or level that saves you time and money when operating conditions are not definitely known or processes are likely to be changed. Extreme flexibility of design lets you adapt the same transmitter chassis for almost any range of measurements—often without any change of parts.

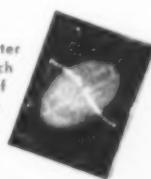
Process Model pictured above has a differential range of 0-12" H<sub>2</sub>O minimum and 0-880" H<sub>2</sub>O maximum at operating pressures to 1500 psig. Other models are available for differential ranges as low as 0-0.6 H<sub>2</sub>O or as high as 0-750 psi.

Transmitters may be constructed of special materials to handle almost all types of corrosive fluids. Ruggedly built, they give long service out-of-doors. Accuracy is guaranteed at  $\frac{1}{2}\%$  of full range on standard models.

Republic transmitters are used in process, chemical and petroleum plants all over the country. Investigate their advantages for your plant.

**FREE DATA BOOK**

Get the full story about Republic transmitter flexibility. Send for free Data Book which gives all the facts about complete line of Republic transmitters, including Square Root Extracting and Pneumatic Electric models.



**REPUBLIC FLOW METERS CO.**

2240 Diversey Parkway, Chicago 47, Illinois

Two Reasons why  
**CHAPMAN** →  
**STEEL VALVES**  
Keep Maintenance Low in  
High Pressure Service

*Carefully-formulated alloys and accurately-detailed contours give Chapman Steel Valves unexcelled dependability under the most severe high pressure and high temperature conditions.*

Fourteen alloys are made in Chapman's own foundry, under rigid laboratory supervision, to ensure that every valve is made of the right steel for its specific service.

Precision manufacture to close tolerances is *standard* in Chapman Steel Valves. Designs have been refined to meet the demands of years of smooth operation at



minimum maintenance costs. Quality is unsurpassed.

For gates, globes and checks in all pressure classes — 150, 300, 400, 600, 900, 1500 and 2500 psi — and for temperatures to 1150°F, see Chapman first. Valves are supplied with welded, pressure seal or bolted bonnet joints and with flanged or welding ends. Valves equal or exceed ASA standards in every range.

Write for Catalog 20.

**THE CHAPMAN VALVE MANUFACTURING COMPANY**  
INDIAN ORCHARD, MASSACHUSETTS

# TIMELY COMMENTS



## CONFIDENCE Is Essential

### Management-Supervisor Can Activate Plans for Progress

**C**ONFIDENCE implies willingness to go ahead —belief in the future. Confidence implies faith in one's associates—belief that they will try to do what is right. Confidence implies trust —belief that there will be no betrayals. Without confidence, there can be no progress.

Confidence is based on people more than on things.

Ideas backed by leaders in whom people have confidence constitute the backbone of industry. Stocks are bought in expectation of returns, and employees work because they believe they will be paid and advanced.

Here are a few industrial factors wherein confidence spells the difference between profit and loss.

- 1—Department heads lose sight of economy when profits are high, because they do not believe profits will be saved for a "rainy day," or added on as bonuses.
- 2—Budget makers "shoot high" because they do not believe their management will thoroughly analyze their problems or exhibit reasonable attitudes if unforeseeable conditions force expenditures above budgets. And then (in the last quarter) they try to spend all money budgeted, for fear they cannot get it reappropriated next year.
- 3—Engineers overdesign and overexpend because it is easier to get capital than to explain deficiencies or failures.
- 4—Accountants keep unnecessary records because the manager might not understand real economy in office procedures.
- 5—Maintenance heads buy excess materials because they are afraid their machinists may spoil work. And machinists become careless because quality work is not expected.
- 6—Contractors do a quick, cheap, "good looking" job because they do not believe their employers can appreciate the niceties of top quality work.
- 7—The manager is afraid to attempt a new

product because his salesmen fight new ideas.

- 8—Workers and unions strive for maximum pay today because they doubt that they will be treated fairly on long range security.
- 9—Craftsmen stick to old procedures because they think there is a "trick" in the suggested new plan.
- 10—Newer and better materials are refused because the purchasing agent does not believe the new supplier is dependable.

Without confidence there can be no real cooperation and best industrial economy becomes impossible. That is why the daily or weekly conference period in industry is so important. Confidence increases with understanding. Various groups want to know what the others are doing, and why. The best decisions of management are of little worth unless they are understood and enthusiastically activated.

Recently, a Southern utility president in a periodic discussion with his supervisors said:

"One of our foremost problems is the expansion of business or reduction in expenses so that added capacity may be more profitably utilized. A combination of both is expected. For the company to realize a \$1.00 increase in net income through a reduction in operating expenses would require a gross reduction of \$2.13 in expense. To get a \$1.00 increase in net income through increased revenue would require a gross increase in sales of \$6.78. In some instances, it is easier and quicker to reduce expenses \$2.13 than it is to increase revenue \$6.78 to get the \$1.00 in increased net income. In other cases the reverse is true. Therefore, the emphasis is on both reduction in expenses and increase in sales."

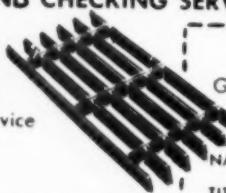
This frank statement and the detailed explanation that followed, together with the joint discussion of ways and means, will do much to build confidence. We believe his employees will both save and sell.



**Q.** How can I avoid costly field corrections when installing floor grating?

**A.** SPECIFY BORDEN and receive a completely custom fabricated floor grating including cut-outs, toe plates, fasteners and stair nosings. Be sure with BORDEN's FREE PLANNING AND CHECKING SERVICE.

Write for complete information on BORDEN'S free planning and checking service in this FREE booklet



**BORDEN METAL PRODUCTS CO.**

Gentlemen:

Please send me BORDEN Catalog #AT254.

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**BORDEN METAL PRODUCTS CO.**

853 GREEN LANE ELIZABETH 2-6410 ELIZABETH, N. J.  
SOUTHERN PLANT—LEEDS, ALA. — MAIN PLANT—UNION, N. J.

# INDUSTRY SPEAKS

SOUTHERN POWER  
AND INDUSTRY

## Money for Progress Must Be Supplied by the People

Adapted from an address by **A. L. M. WIGGINS**, Chairman of the Board, Louisville & Nashville Railroad Company, at the dedication of Radnor Yard, Nashville, Tennessee, September 22, 1954.

**R**ADNOR YARD is more than a physical and financial achievement. It is an expression of faith and a symbol of the dynamics of American Private Enterprise. The expenditure of \$15 million capital outlay for a physical facility not only called for courage of a high order but an expression of faith in the future of the Railroad Industry and of this area.

Estimates of the economies in the operation of this yard, based on a reasonable historic volume of traffic, fully justified the investment and showed a percentage return on the outlay in excess of sixteen per cent per annum. There is no question in our minds but that the dynamic growth of business and industry in this territory, which in recent years has moved ahead at a greater accelerated pace than in most other sections of the United States, will continue its relative growth. Per capita income will continue its notable rise. Natural resources will be further developed. Productive facilities will be multiplied.

For the most part, the cost of this yard has been paid for out of the retained earnings of the Louisville and Nashville and the Nashville, Chattanooga and St. Louis railroads. This means that there had to be a net income sufficient to make capital investments and also to pay stockholders reasonable dividends. This investment will contribute to future earnings which, in turn, will make possible other improvements and contribute dividends to stockholders.

The preservation of our Private Enterprise System and the preservation of the railroad industry in this country under private ownership require financial health, reasonable earnings, and the payment of proper dividends to stockholders. The unquestioned lesson we have learned from Socialization throughout the world is that Nationalization of industry is a direct product of the failure to earn a reasonable income. The payment of a reasonable

portion of earnings as dividends to stockholders is the fuel that provides the financial motive power of our Private Enterprise System.

This extensive railroad facility was made possible, financially, as a result of a long record of producing earnings which have sustained sound capital structures, vigorous improvement programs and a moderate return to investors.

The justification of the outlay involved in this project is in the performance of a more valuable service to the people and to the business and industry in this area. It is on service and service alone that a business must stand or fall.

The energies of management of these railroads are devoted to the discovery of new and better ways to perform better service and with greater economy. Many of the opportunities for such improvements require capital outlay. Such capital outlay, when greater than can be provided by funds available from earnings, must come from the investment community. Funds are available in adequate amounts and at reasonable rates only to institutions that demonstrate financial vigor through reasonable earnings and through the application of management energies to the wise use of funds for plant modernization and improvement, for increased efficiency and for greater economy.

The financial community has demonstrated its confidence in these two railroads throughout the years. And the railroads, throughout the more than 100 years of corporate existence, have scrupulously kept every financial obligation, have maintained a policy of distributing a fair portion of net income to stockholders and have fully justified the confidence they have received.

The consolidation at Radnor Yard of operations formerly carried on in the old yards in the heart of the City of Nashville makes possible the utilization of a most valuable property for business and industrial use to meet the growing needs of Nashville. There will be the closest cooperation on our part with city officials and business interests to develop this property in a way that will add to the greatest degree to the economic life of this community.



Fig. 1. Two views of rear of plant, looking East and Northeast respectively. Individual equipment may be identified from the plan drawing, Fig. 3.

## Gulf States Utilities Company Demineralizes

# 40 MILLION POUNDS OF WATER PER DAY 100 Per Cent Feed to 1,500 Psi Boilers\*

**G**ULF States Utilities Company has been delivering 135 psi gage steam from its Baton Rouge, Louisiana, plant to nearby industrial customers since 1930. Until 1954 this steam was generated at 600 psi gage, the maximum pressure considered feasible in 1930 for 100 per cent boiler feedwater make-up. Thus, by-product electric power was limited to that produced as the steam expanded through the turbines from 600 psi gage to 135 psi gage.

The water treatment plant, which satisfactorily meets the needs of the 600 lb plant, consists of two stage clarification and silica reduction of Mississippi River water in the cold by precipitators using lime and ferric sulfate. This is followed by filtration and sodium zeolite softening. The average output from that treating plant is over 5,000 gpm of softened water.

### 1954 Expansion Program

Because of the demand for more process steam by neighboring cus-

By  
**W. B. GURNEY**

Efficiency Engineer, Gulf States Utilities Company

and

**C. R. STEWART**

Mechanical Engineer, Stone & Webster Engineering Corporation

tomers and the continually increasing electric power requirements, considerable expansion was required for 1954. And, since none of the condensate is returned, an additional demand for 3,000 gpm of boiler feedwater was created.

Studies indicated that it would be practical to generate steam at a higher pressure (1,500 psi gage and 950 F), so more kilowatts per pound of process steam could be generated.

To satisfy this condition of 1,500 psi gage and 100 per cent make-up, a water of much better quality than that being delivered to the existing 600 psi gage plant was

deemed imperative. Recent developments in demineralization and silica removal with resins indicated that water approaching normal condensate quality could be produced economically in this manner. The initial investment and operating costs would be much below the costs of producing feedwater by evaporation.

### Water Supply

Two sources of water were considered for producing this deion-

\* Abstracted from companion papers presented by Messrs. Gurney and Stewart at the American Power Conference in Chicago, March 24-26, 1954.

ized water. Mississippi River water would have to be clarified and filtered before going to the cation resin. Therefore, well water was decided upon as being less expensive, considering both installation and operating costs.

Well water from the 2,000 ft strata was previously used for make-up to the cooling towers. To avoid additional take from this strata, wells were drilled to the 2,800 ft strata. This water, being twice as high in solids as the 2,000 ft strata, was diverted to the cooling towers so the 2,000 ft well water could be pumped to the deionization plant.

This shift in usage actually reduces the take from the 2,000 ft strata. However, additional wells have been drilled in the 2,000 ft strata for reserve. Although these wells can deliver 1,000-1,200 gpm each, they will be operated normally at 850 gpm each to prolong their life. The cost of the well water program is less than one quarter the estimated cost of a clarification plant for Mississippi River water.

In addition to this, the chemical cost of deionizing the well water was estimated at 8 cents per 1,000 gal, whereas the clarified river water would be 15 cents per 1,000 gal plus the cost of preliminary treatment.

The well water, however, presented important problems:

1. The sodium and silica were high. Tests were required to determine how to keep the effluent sodium and silica low enough for high pressure boilers and turbines.
2. Traces of hydrogen sulfide exist at times.

On the other hand the well water had numerous advantages:

1. Constant water analysis; therefore, constant output by cation and anion units; also constant chemical levels
2. Very low organic matter and bacteria
3. Anion load reduced 80 per cent by vacuum removal of  $\text{CO}_2$  in cation effluent
4. Low investment in anion resin
5. Zero oxygen entering the system
6. Very low hardness, therefore, high sulfuric acid strengths can be used for the regeneration of the cation units. Also, possibility of using reclaimed acid cycle with sulfuric acid

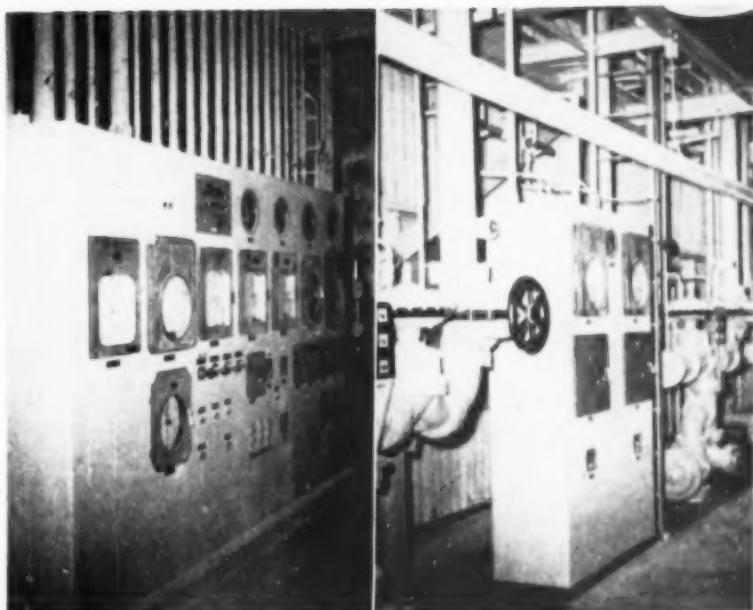


Fig. 2. Instrumentation is very complete to permit minimum attendance. The view at left shows the panel board for automatic anion regeneration. The view at right shows flow meters and valves for anion units 1 and 2.

7. Low hardness; therefore, a minimum of hardness going to boilers to form sludge
8. High ratio of sodium to total solids gives high cation exchange capacities
9. Constant water temperature, 90°F
10. Lower deionization plant investment and lower predeionization plant investment

#### Pilot Plant Tests

To evaluate the effect of high sodium and high silica on the final delivered water, extensive pilot plant tests were made under various conditions utilizing four Pyrex glass tube columns, each 4 ft long, 4 in. diameter, with appropriate plastic tubing and valves, and a deaerator for removal of  $\text{CO}_2$  between cation and anion beds.

The general method used in testing was developed over the past 10 years and is as follows:

#### Cation Resin Tests

Regenerate the resin with excessive chemical such as 30 to 60 lb  $\text{H}_2\text{SO}_4$  per cubic foot then run the bed to exhaustion with the water under test. Exhaustion is when a definite rapid rise in leakage is obtained in the effluent. This procedure is repeated three times noting

each time the exchange capacity and effluent quality. During the run, tests are made on the effluent for sodium, hardness, pH, conductivity,  $\text{CO}_2$ , F.M.A., etc. This is to establish leakage level characteristics of the resin for the water considered and also a leakage level to aim for with economical use of chemicals.

During the fourth regeneration, still with excess acid, all the regenerant and rinse effluent is collected progressively in numbered quart jars. Each jar is then analyzed for sodium, calcium, magnesium, sulfate, acidity, baumé, pH, conductivity, chlorides, F.M.A., etc.

An inspection of the rinse collected in the jars, after standing 24 hr will reveal if the rinse water is clear or if insoluble material is forming that may cause future trouble with the resin such as would result in decreased exchange capacity, poor effluent quality, or deterioration of the resin.

The analyses of the rinse waters and various ratios such as sodium to sulfates and calcium to sulfates are then plotted against volume of rinse water. This plot, plus inspection of the bottles for precipitates,

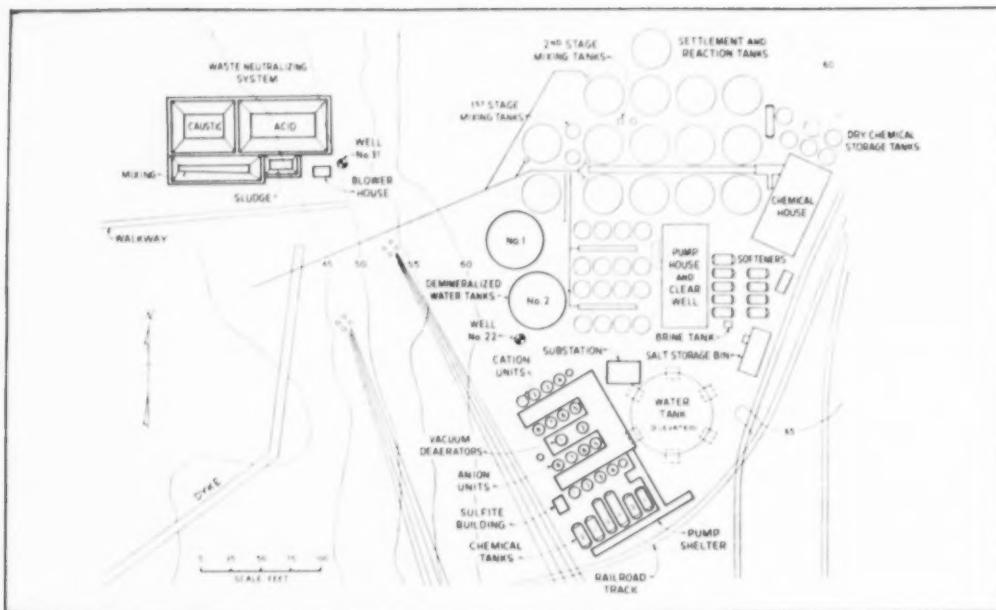


Fig. 3. Plan of water treating area. The new (demineralizing) portion of the plant is shown by heavy lines. Note the small area of the demineralizing plant as compared with the older clarifying and softening plant of about 25 per cent greater capacity.

allows us to estimate the allowable strength of chemical at each interval and the amount of chemical needed to regenerate completely the entire bed economically.

For example, our tests on well water indicated that initial use of 2 per cent  $H_2SO_4$  was unnecessary; that the first 25 per cent of the regeneration could be with 5 per cent fresh  $H_2SO_4$  or with reclaimed  $H_2SO_4$ . The remaining 75 per cent of the regeneration could be done with 10 per cent  $H_2SO_4$ .

On river water, which contained considerable hardness, best results without being involved with precipitates were obtained by starting with 2 per cent  $H_2SO_4$  and gradually increasing the acid strength to 10 per cent when three-fourths of the chemical was in. Reclamation of sulfuric acid was found inadvisable when demineralizing hard water. Practical regeneration was done with 2 per cent acid for the first third of the regeneration, five per cent second third, then 10 per cent.

Various rates of regeneration were tried. Rates below 1.0 gpm per sq ft of area often resulted in short runs and erratic performance. This indicated regenerating and

rinse rates so low as to result in leaching of acid through the bed. Apparently the rate must be high enough to create a pressure drop across each resin particle so as to obtain good distribution of acid throughout the bed and thus regenerate each particle of resin. Rates above 1.5 gpm per sq ft area tended to give lower exchange capacities and higher effluent sodium.

The optimum rate of 1.2 gpm per sq ft area, therefore, appeared to be low enough for contact time and fast enough to prevent leaching.

This rate was the optimum for all strengths of both sulfuric and hydrochloric acids. In practice two per cent  $H_2SO_4$  was introduced at higher rates because of the time factor. The 10 per cent  $H_2SO_4$  was increased slightly to offset this factor.

All regenerant strengths of chemicals and temperatures were governed by the strength, temperature, and condition of the effluent.

Having established the chemical levels temporarily for the straight and reclaimed cycles, repeated exhaustion runs were made on the resin for final adjustment and confirmation of the preliminary findings.

Analyses of the effluent during the run and the exchange capacities obtained were tabulated for each run.

If the effluent sodium increased progressively during each run, increased acid was indicated. The acid would be increased slightly each run until the sodium in the effluent started decreasing. Conversely, if the sodium in the effluent decreased or remained very low decreased acid was indicated.

Any increase or decrease in chemicals added was done by changing the amount of fresh chemical added. The quantity of reclaimed chemical in the rinse was kept constant. Reclaiming started when the chemical level, as shown by the interface between chemical and water, reached the top of the bed and ended at the zero  $-0.5$  Be of the rinse effluent.

#### Anion Resin Tests

Similar tests procedures were used when testing the anion resins using the degassed high silica cation effluent. In this case tests were made on the spent regenerant for phenolphthalein alkalinity, methyl orange alkalinity, sodium, caustic alkalinity, baumé, conductivity, sili-

ca, chlorides, and sulfates with particular emphasis on the silica-sodium ratio.

To avoid possible precipitates with such high silica water, it was found advisable to reduce the first quarter of the regeneration to 5 per cent fresh caustic or to use reclaimed caustic. The remaining regeneration could be 10 per cent.

Regeneration with cold caustic resulted in poor effluent quality and low exchange capacities. Investigation of temperature effects revealed that temperatures of 120 F (measured at the effluent) as well as high caustic strength was very important to obtain low silica in the anion effluent. Decreased caustic charge and increased kilograin exchange were appreciable. As with the cation resin, the optimum regeneration and rinse rate was found to be 1.2 gpm per sq ft area irrespective of caustic strength or other factors. To maintain exchange capacity and good quality effluent for years, it appears imperative that adequate caustic be used to fully clean and regenerate the anion resin.

Type I resin was regenerated at 120 F, and Type II at 92 F. Incidentally, development of the technique for making these analyses was not simple.

Considerable difficulty was experienced with contamination of the anion bed due to iron, copper, and aluminum in the influent water. The aluminum formed a flocculant precipitate whereas the copper and iron coated the resin. The source of these metals, (piping and pump parts), was eliminated and the resin replaced. Attempts to clean up the resin with warm hydrochloric acid did not appear to be too successful inasmuch as the original exchange capacity and effluent quality were not fully restored. Copper was particularly troublesome.

### The New Plant

While the new demineralizing plant by itself is a complete unit, there are several instances in which advantage was taken of conditions associated with the older water treating plant. The complete water treating area is now capable of producing a total output of over

### DEMINERALIZING PLANT WATER ANALYSES

Constituents—PPM	Average Well Water	Average Clarified River Water	Demineralized Water, Maximum
Calcium (Ca)	0.8	21	—
Magnesium (Mg)	0.2	6	—
Sodium and Potassium (as Na)	78.0	26	—
Chloride (Cl)	1.5	43	—
Sulfate (SO <sub>4</sub> )	2	33	—
Nitrate (NO <sub>3</sub> )	—	2	—
Bicarbonate (HCO <sub>3</sub> )	161	6	—
Carbonate (CO <sub>3</sub> )	23	24	—
Hydroxide (OH)	—	3.5	—
Silica (SiO <sub>2</sub> )	26	5	0.1
Carbon Dioxide (CO <sub>2</sub> )	—	—	0.1
Suspended Matter	0	0	—
Free Oxygen (O <sub>2</sub> )	—	—	0.1
Total Dissolved Solids (Calc.)	291	172	2.0
pH	9.6	10.5	—

4,000,000 lb of boiler feedwater per hour.

The demineralized or condensate quality, part of this total is fed to the new 1,500 psi boilers. Steam exhausted from all the turbines of this new part of the station goes to the neighboring industries at 135 psi pressure.

The necessity of operating the new plant with a minimum of manual labor, as well as the very critical water quality, led to a plant design which includes exceptionally complete instrumentation and automatic controls.

The plant as a whole is designed to treat either natural well water or clarified Mississippi River water, with net capacity of 5,040,000 gal per day (3,500 gpm) demineralized water of condensate quality.

Well and clarified river water supplied to the demineralizing plant analyze approximately as shown in Table I, and the last column of this table shows the quality of finished water specified.

The plant as built and shown in plan arrangement in Fig. 3 includes the following features:

The plant is of the two-bed type with vacuum deaeration before anion exchangers.

The entire group of eight cation units are connected to loop headers so that each unit operates and is regenerated entirely independently of other units. An equal number of anion units are arranged similarly.

Exchange materials are styrene cation and highly basic, Type I, anion resins.

Finished water is delivered through pipes lined with baked phenolic resin and stored in half million gallon tanks having floating seals and vinyl resin linings.

Control of plant flow and flow through individual units is by manual valves.

Three or four unit regenerations are expected each 24 hr, using well water.

Either sulfuric or hydrochloric acid may be used for cation regeneration.

Regeneration is two or three step utilizing about one-third reclaimed chemical, with provision for warming the caustic regenerant.

Regeneration is carried out automatically after initiation by push button. Return to service is by push button also.

Unusually complete instrumentation and sampling facilities are provided to guard water quality, including pH and conductivity records on each unit and a recording flame photometer to show sodium in the effluent of any unit.

All manifold valves are single Saunders type with close coupled diaphragm operators, air loaded to close.

Mildly contaminated waste water is used for cooling tower make-up or recycled. Stronger chemical wastes are neutralized by mixing together and with alkaline sludges from the older clarifiers then discharged to the swamp.

An interesting comparison between plants of relatively small difference in capacity, but handling waters of radically different types is shown in Fig. 3. The older plant clarifies 4,500 gpm of river water, and utilizes most of the ground area while the new demineralizing plant occupies relatively little more space than the older softeners and clear well.

In general, the new plant is of the outdoor type, only the operating areas are enclosed. The instruments, controls, pumps and manifold valves of all units are under roof.

Cation and anion exchange units, as well as all pumps, and regenerant tanks are set at ground grade. Deaerators are elevated and sup-

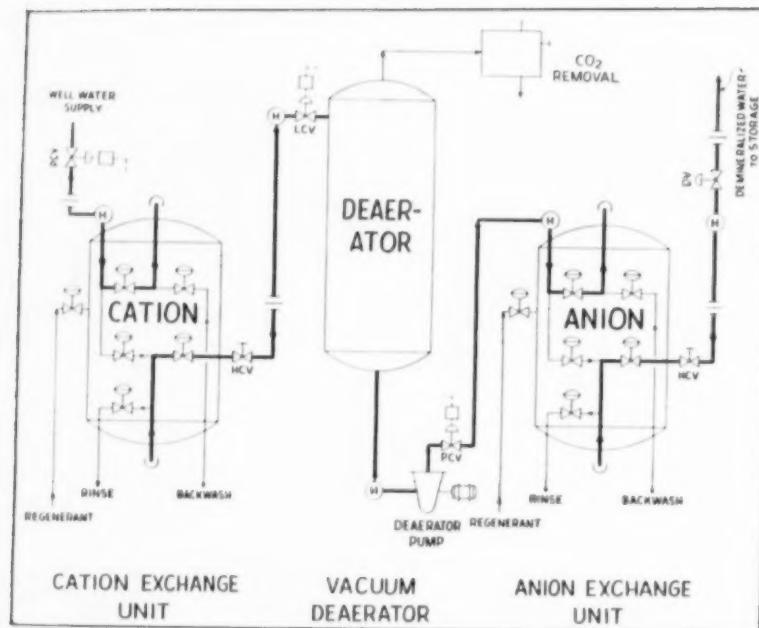


Fig. 4 Flow of water through the new Permutit demineralizing plant during normal service.

ported on structural steel.

All operations associated with the plant may be carried out either semiautomatically or manually. Semiautomatic control is effected by the use of pneumatic-electric program switches, timers, operations counters and associated solenoid pilot valves.

#### Cation Exchange Units

Flow of water through the plant during normal service is shown in Fig. 4. Well water from the 2,000 ft stratum is delivered by pumps through a gathering system to the cation inlet headers at a regulated pressure of 50 psi gage and then to eight cation exchange units where the positive or metallic ions,

such as calcium, magnesium and sodium, are removed in passing through the beds of styrene cation exchange resin. Block valves in the headers facilitate shutdown of any quarter of the header system and the two units affected, while the remaining six units continue in service.

All diaphragm operated manifold valves have enclosed stems and are equipped with position indicators in clear Lucite tubes. Control air lines to all normal inlet and outlet valves of all units have air lock valves to prevent interruption of operation during a brief air failure. Regenerator inlets have manual block valves at the units to permit service work on the regenerator sys-

tem while units are in normal service.

Effluent flow from each exchange unit is recorded and integrated, the integrator serving to pulse a counter preset for the total the exchange unit can treat between regenerations. This counter sounds an alarm to indicate approaching bed exhaustion and the need for regeneration. The pH recorders are equipped also to sound an alarm when the pH for any unit exceeds a set value.

#### Vacuum Deaerators

The effluent from the exchange units passes into the two cold water vacuum deaerators for removal of free carbon dioxide and oxygen. The vacuum deaerators are rubber lined, vertical steel tanks, each capable of handling the full plant output. Each vessel is equipped with a 3-stage steam jet evacuating system.

#### Anion Exchange Units

The cation treated and deaerated water is pumped through the anion exchange units where negative ions, such as sulfate and chloride, also the silica and residual CO<sub>2</sub>, are removed in passing through beds of highly basic exchange material. Material and design of anion units are similar to those described for the cation exchange units except a conductivity alarm sounds to indicate poor quality of effluent.

#### Water Storage System

The effluent from the plant is delivered into three half million gallon demineralized water storage tanks from which it is pumped to

#### PRINCIPAL EQUIPMENT

##### WATER SUPPLY SYSTEM

**Deep Wells** ..... W. M. Eberhart & Son  
**Deep Well Pumps** ..... Fairbanks, Morse & Co.  
**Storage Tanks** ..... The Chicago Bridge & Iron Co.,  
 3-50 ft diam, 34 ft high, floating seal and umbrella roof  
 type welded steel, 500,000 gal each, coated internally with  
 vinyl paint

##### DEMINERALIZING PLANT

**Exchange Units** ..... The Permutit Company, 8-Cation,  
 11 ft-0 in diam, 13 ft-2 in straight side, 8-Anion, 11 ft-0  
 in diam, 12 ft-2 in straight side. All are 3-16 in. rubber  
 lined steel tanks with hub and lateral distributors. Under-  
 drain laterals are curved to fit dished heads.  
**Vacuum Deaerators** ..... The Permutit Company, 2-10 ft-0  
 in diam, 34 ft-0 in straight side, 3-16 in. rubber lined, 1  
 in. Rasching ring filling  
**Evacuating Steam Jets** ..... Ingersoll-Rand Company  
**Resins** ..... The Permutit Company. Cation—

624 cu ft each, Permutit Q; Anion—380 cu ft each, Permu-  
 tit S-1

**Deaerated Water Pumps** ..... Ingersoll-Rand Company

**Chemical Tanks** ..... The Permutit Company, rubber

lined for hydrochloric acid, otherwise unlined steel

**Piping at Units** ..... The Permutit Company, rubber

lined steel with Conoflo valves

**Piping for Finished Water** ..... U. S. Pipe & Foundry Co., Here-

site lined by Tube-Kote, Inc.

**Chemical Pumps (Acid) (Cation)** ..... The Duriron Company

**Automatic Program Controllers** ..... The Taylor Instrument Companies

**Chemical Proportioning Controllers** ..... Fischer & Porter Company

##### INSTRUMENTS

**Conductivity Recorders** ..... Leeds & Northrup Company

**pH Recorders** ..... Leeds & Northrup Company and

Brown Instrument Company

**Chemical Flowmeters** ..... Fischer & Porter Company

**Water Flowmeters** ..... Hailey Meter Co.

**Flame Spectrophotometers** ..... Perkin Elmer Corporation and

Beckman Instrument Company

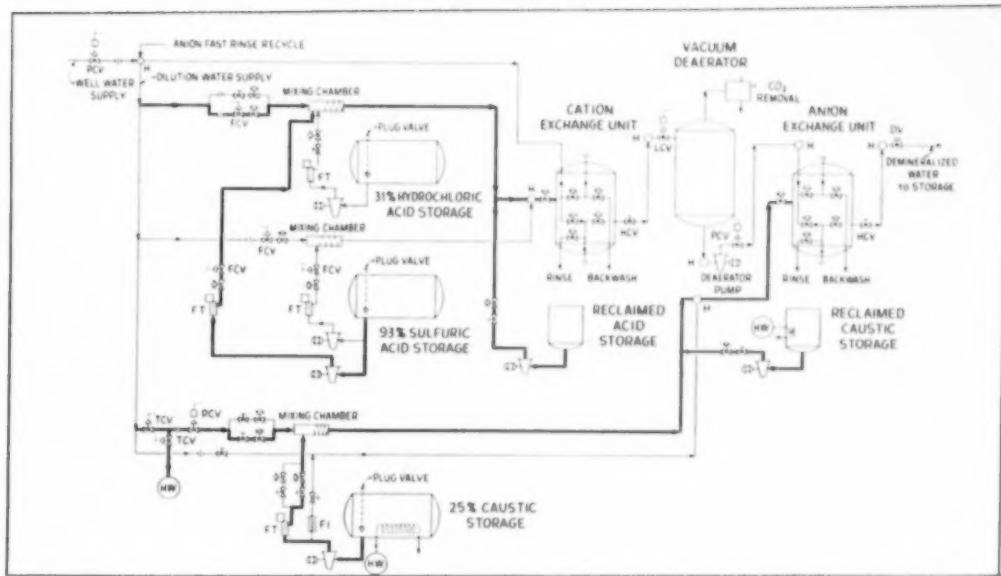


Fig. 5. Flow diagram of regenerating system.

the generator coolers, boiler feed deaerating heaters and through surface heaters into the boilers.

The storage tanks have protective coatings of vinyl paint applied to all internal surfaces to reduce iron pick-up. Pick-up of oxygen is retarded by the use of pontoon type floating roofs, with submerged continuous rubber seals between the pontoons and straight sides of tanks. Water lines to all

storage tanks have baked phenolic resin linings.

#### Regenerating Systems

Backwashing is done with normal influent water for each exchange unit. After passing upflow through the unit, it is discharged as make-up to one of the cooling towers of the older part of the power station.

Equipment and connections for

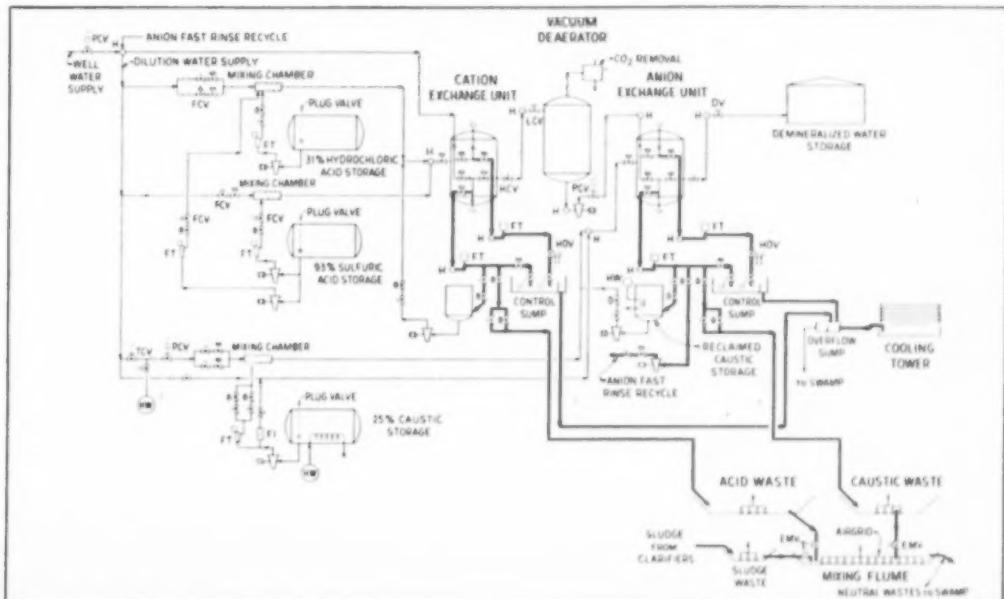
the regeneration of exchange units are shown simplified in Fig. 5.

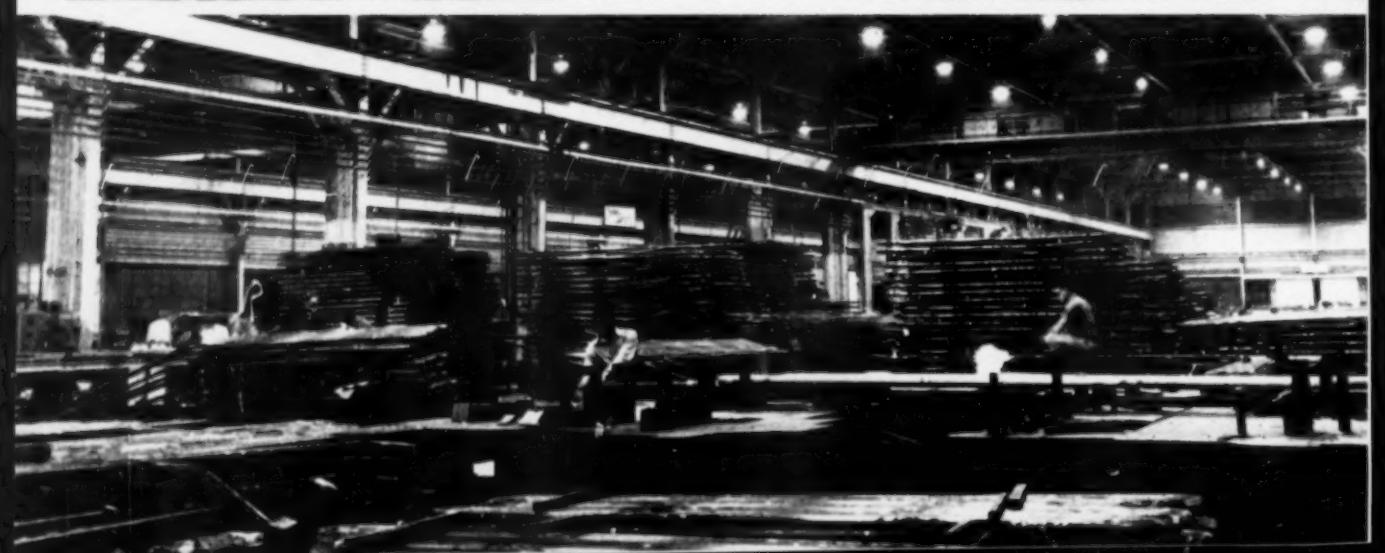
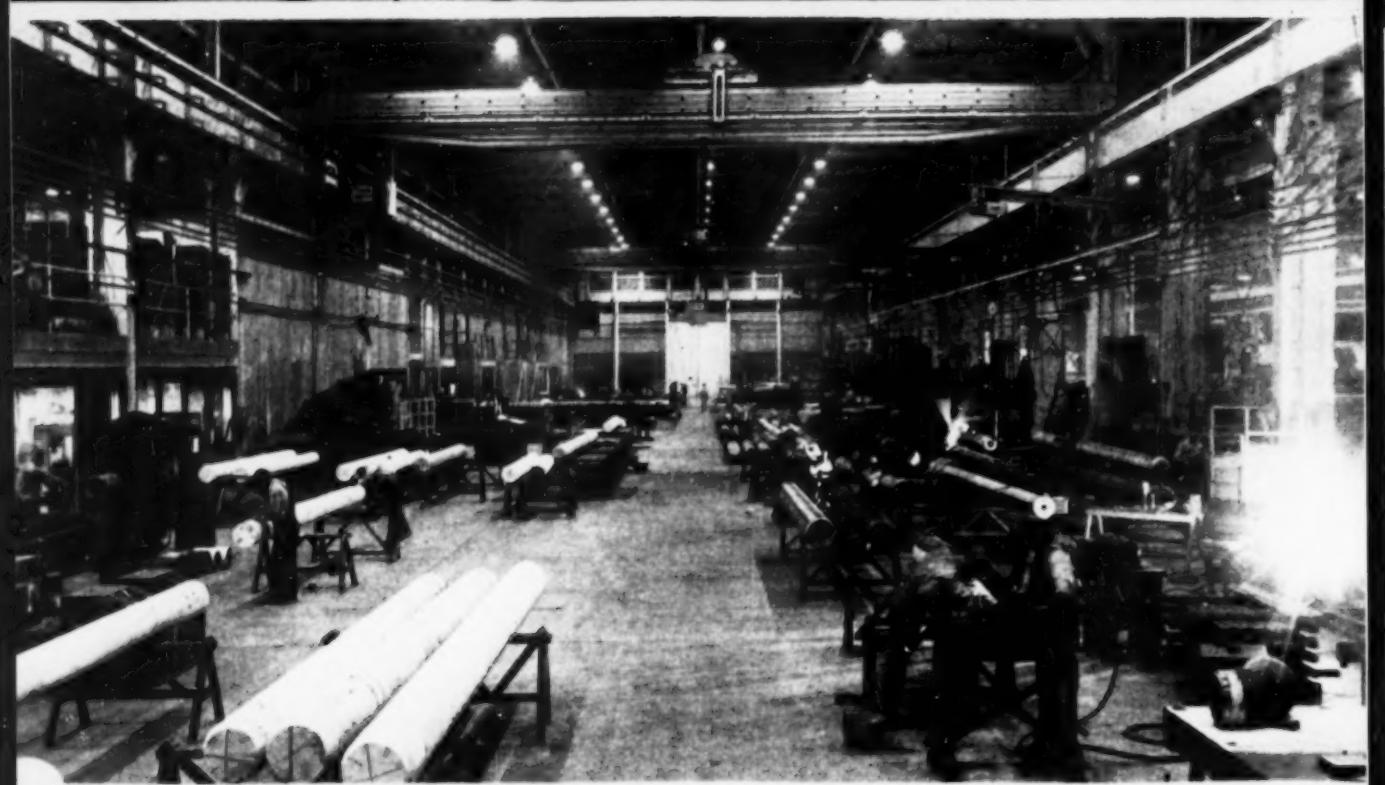
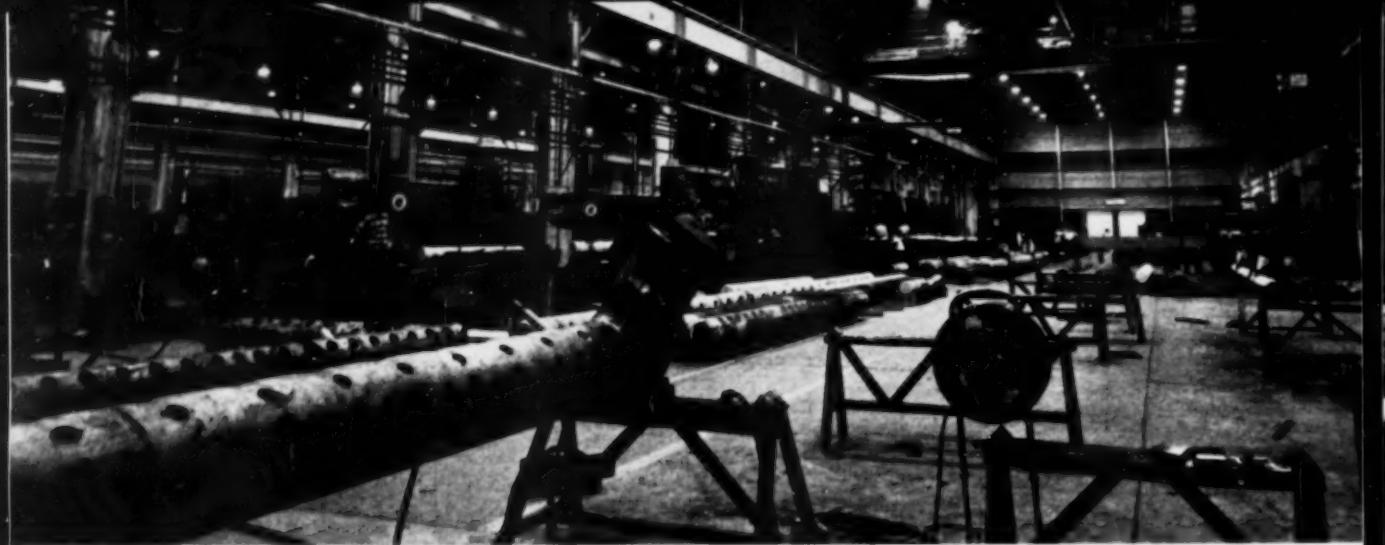
Two separate automatic regenerating systems for the cation units are provided as follows:

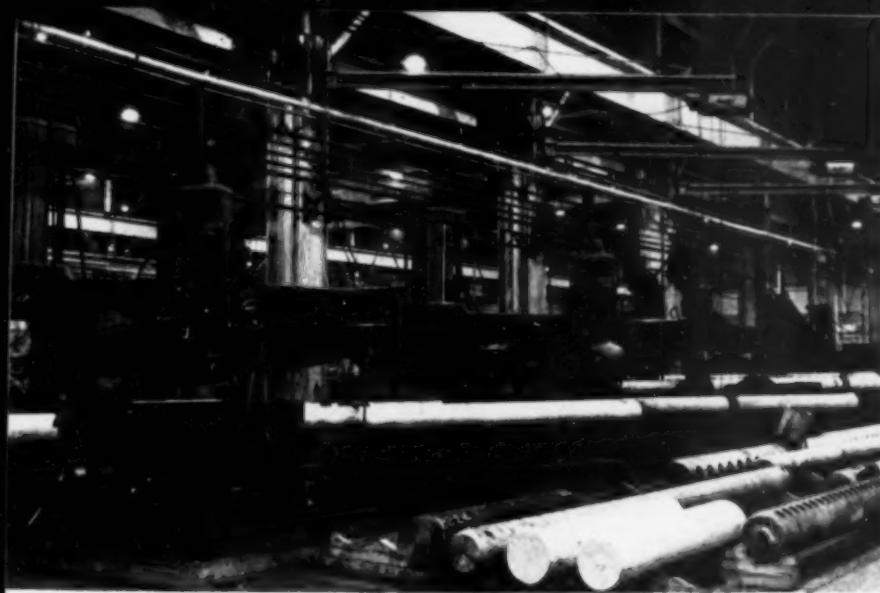
The first system provides automatic regeneration by the introduction of reclaimed sulfuric acid followed by diluted 93 per cent sulfuric acid in two steps with concentrations increasing from approximately 3 to 10 per cent in the three steps, or the use of reclaimed hydrochloric acid followed by diluted 93 per cent sulfuric acid and then by diluted 31 per cent hydrochloric acid.

(Continued on page 78)

Fig. 6. Flow diagram of waste disposal and reclamation system.







## Lighting for B&W Texas Plant

WHEN the Boiler Division of The Babcock & Wilcox Company decided to build its plant at Paris, Texas, careful consideration was given to lighting because of its effect on the safety of the plant, its effect on employee comfort and the resultant efficiency in operations. Blueprints called for the relatively high ceilings that are essential in heavy manufacturing.

Because of the man-hours and inefficiency involved in handling portable lighting equipment, the company wanted a stationary system that would illuminate the ceiling area and still guarantee uniformly good lighting for the employees at normal working level. This was accomplished by using a combination of mercury and incandescent lamps.

The major working area is divided into three operating bays, each bay 80 ft wide and 500 ft long. By day, under a good Texas

sun, five ceiling skylights extending the entire 500 ft length of the manufacturing area, supply sufficient illumination for efficient work.

For night lighting and for days when natural light is dulled by clouds or rain, a combination fluorescent-mercury and reflector-incandescent illumination system was installed by Babcock & Wilcox when the structure was erected.

In each of the three bays there are forty 1000-watt fluorescent-mercury lamps (C-H12) and twenty 800-watt R-57 reflector incandescent lamps mounted at a height of 35 ft. The lamps are installed along the 500-ft length of each bay on 25-ft centers, each bay having two rows of mercury and between them, one row of incandescent. The rows are on 20-ft centers across the 80-ft width. Thus, each of the three long rows in each of the three bays has 20 lamps for a total of 180 lamps (about 178,000 watts) in the 120,000 sq ft area.

At floor level the maintained lighting measures 15 footcandles, and at the 6 ft level illumination registers 22 footcandles main-

tained. The resultant excellent lighting from this unusual reflector-incandescent and fluorescent-mercury installation serves a double purpose. It not only produces a comfortable and efficient amount of color-accurate white light for operators working on dark-toned metals, on which drilling layouts have been pre-marked with chalk of various colors, but also it supplies more than adequate illumination at floor level for elevated crane operators working in moving cabs.

From their cab positions in the overhead cranes (which, incidentally, use newly-designed Westinghouse a-c controls for both

(Continued on page 82)

By

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Each 500 ft bay has two rows of mercury-fluorescent lamps with one row of incandescent units between them



Big as a football field, the pond in left foreground is used to store wood under water at Bowaters' new paper mill at Calhoun, Tennessee. This is in contrast to normal mill operations where wood is stored on the ground. The pond is the first of its kind and is capable of holding 30,000 cords of wood, enough to keep the mill running for about six weeks. Aligned with the pond, which is 500 ft across the top, are unloading facilities for rail, truck and barge, the rotary barkers and the wood house. See diagram on opposite page.

## HANDLING EQUIPMENT

# Bowaters Southern Paper Corporation

THE initial design capacity of The Bowaters Southern Paper Corporation plant at Calhoun, Tennessee, is for the production of 125,000 tons of newsprint per year and 50,000 tons annually of either unbleached or bleached kraft pulp for sale.

The newsprint furnish requires daily approximately 360 tons of pine groundwood and 120 tons of bleached kraft pulp; with the total kraft pulp requirements, including that for sale, being approximately 312 daily tons.

The daily chemical consumption is approximately 20 tons of salt cake, 8 tons of caustic, from 8 to 18 tons of chlorine, and 14 tons of lime. For the news furnish about 4000 gallons of 32° Baume liquid alum is used, and 1200 gallons for water treatment. Quantities of limestone, soda ash, and chemicals

Staff prepared from data furnished by engineers of Bowaters Southern Paper Corporation, and D. G. Moon of J. E. Sirrine Company.

for slime prevention, color, etc., are also required.

The plant will have between 700 and 750 employees and at least an equivalent number will be employed directly or by independent contractors for pulpwood production. Approximately three and one-half million dollars will be paid annually for wages at the plant; and a similar amount, or more, in connection with the wood supply.

### Wood Handling and Preparation

A total volume of 906 cords of pine per day is used. It is shipped by river barge, railway,

and trucks. Unloading of these carriers is accomplished as follows:

Adjacent to the river dock are, in order of their distance from the river, the following unloading facilities:

- 1—A pivoted gantry crane which can be equipped with either an orange-peel grapple for unloading logs
- 2—A hook for handling slings of logs, or a clamshell bucket for unloading chips
- 3—A graded railway siding with car retarders to be used in properly spotting pulpwood cars by remote control



Diagram showing arrangement of equipment.

4—A pulpwood pit having a runway on which is placed an electric pulpwood rake to unload cars into the pit

5—Space for a crawler crane equipped with an orange-peel grapple for use in periods of maximum wood shipments.

A movable multiple-chain feeder receives wood from the crawler crane and feeds it onto a drum feed turntable.

Wood is unloaded from barges by the gantry crane and may be placed directly on a multi-chain feeder or into the pulpwood pit. Wood arriving in railway cars may be similarly unloaded, but is more rapidly unloaded into the pit by the pulpwood rake. Truck wood can be unloaded into the pit by means of either of the cranes or manually, or onto the movable feeder by the crawler crane.

All wood placed in the pit is rehandled by the gantry crane or

the crawler crane onto one of the two multi-chain feeders which drop the logs onto a revolving, elevated turntable used for final sorting of species and for feeding wood selectively to all or any of the three barking drums. This turntable, a flat ring in shape, is 60 feet in diameter and 7 feet wide, and runs continuously. Removal of wood from the table to the barking drum feed chutes is by means of hydraulically operated, remote controlled blades.

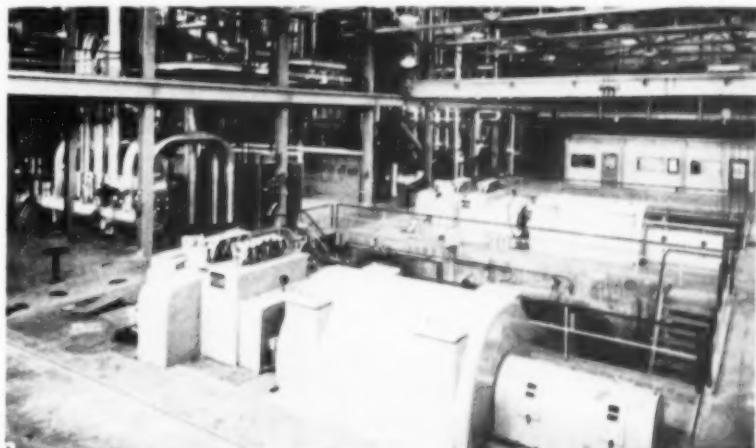
There are three suspended type barking drums, each 12 feet in diameter by 45 feet long. The dry method of barking is used. Bark

is transported to the bark burning boiler by belt conveyors.

Wood is fed from the barking drums to two parallel cable conveyors which run from the drums through the woodroom, to the center of a duplex storage pond. These conveyors have a figure eight arrangement in elevation so that wood loaded onto the lower strand at the drums arrives at the pond center on the top strand, and wood recovered from the pond and reloaded onto the conveyor starts on the lower strand and arrives at the top floor of the woodroom on the top strand. The duplicate arrangement of the pond and all equipment for storing and recovering wood is due to the necessity of keeping the wood prepared for the groundwood mill separate from that for sulphate pulping.

At the pond center wood is dumped from the cable conveyor to a 40-foot diameter turntable, and thence is scraped onto a revolving stacking conveyor of special design which places the wood in a semicircular pile having a central radius approximately half that of the pond. The pond itself has a total volume under water for 30,000 cords.

The recovery of wood from the pond is by means of duplicate pivoted gantry cranes, each equipped with a hoist, trolley, and special pulpwood grapple. Wood is placed by these cranes onto chutes at the center of the pond turntables, from which it is scraped off onto the lower strand of the appropriate cable conveyor.



General view of the power house showing operating floor with two 10,000 kw turbo-generators in the foreground.

Power equipment in the Bowaters mill was described in detail in the March, 1953 issue of Southern Power & Industry.



A general view of the equipment for dumping wood in the storage pond and recovery of stored wood for use. Uppermost in this view are two pivoted gantries from which the recovery grapples are suspended. Below the gantries are two revolving stacking conveyors that deliver the wood to the pond.

In addition to conveying the wood from drums to pond and from pond to woodroom, the cable conveyors serve as washing flumes to insure removal of residual bark

and grit both prior to storing and upon removal from storage.

#### Washroom Handling

Wood arrives at the top floor of

the woodroom on the two cable conveyors. Both conveyors unload onto a 40-foot diameter turntable, but at different points on the circumference so that wood for mechanical pulp can be scraped off into a butting saw, and wood for chemical pulp can be scraped off into the chipper chute.

Wood for mechanical pulp is removed first in the sequence, so that logs unfit for mechanical pulp can be allowed to pass on to the chipper feed point, or sent back to the barking drums by means of a belt conveyor.

Logs for mechanical pulp having passed through the butting saw fall into a chute feeding a 1900-foot long flume, which carries them to the grinder room where they are elevated from the flume to the apron conveyor feeding the grinders by means of two chain conveyors; the first of a special design for removing logs from water, the second to accelerate the logs and insure proper feeding to the apron conveyor.

For week-end operation when the drums are down, chutes are provided which will allow any partially barked or otherwise unacceptable wood to be sent back to the pond via the cable conveyors, from either the chipper feed point or from the butting saw table.

#### Chip Handling

Wood for chemical pulp having passed through the chipper is fed



Handling pulpwood in the yard of one of the rail shipping points in North Georgia.



Finished newsprint is loaded from the shipping platform into railroad cars on either side.

### Principal Suppliers of Materials Handling Equipment Bowaters Southern Paper Corporation

Allis-Chalmers Mfg. Co.	Vibrating screens
American Monorail Company	Ash handling system
Bailes-Sey Contractors, Inc.	Railroad sidings (installation)
Bristol Metal Products Corp.	Chutes
Brooks Equipment & Mfg. Company	Load Lugger
Carolina Steel & Iron Company	Turntables
Carthage Machine Company	Chipper
Chain Belt Company	Log & chip conveyors
Chattanooga Boiler & Tank Co.	Misc. boxes & chutes
Dempster Brothers	Carloaders
Dings Magnetic Separator Company	Chip magnets
Elevator Service Co.	Erecting freight elevators furnished by
Southern Elevator Co.	
Eriez Mfg. Company	Pressure magnetic humps
Fibre-Making Processes, Inc.	Barking drums
Foster & Woods, Inc.	Chip blowing system
Fuller Company	Airveyor systems
General Railway Signal Company	Track retarders
Gunite Construction Corp.	Lining log pond
Harris, R. L., Inc.	Pulpwood rake
Howe Scale Company	Truck scale
Jefferson Foundry Company	Cable conveyor equipment
Jeffrey Mfg. Co.	Hammer mill, rotary chip feeders
Lamb-Grays Harbor Co.	Layboy & conveyors
Lamson Corp.	Paper roll conveyors
Link-Belt Company	Traveling screens, belt tripper, log feeders, turntable machinery, screw conveyor, log stackers, cable conveyor machinery, soap skimmer, limestone handling system, gantry cranes.
Manning, Maxwell & Moore, Inc.	Overhead cranes & paper reel cranes
Miller Hoff, Inc.	Bark feeder
National Conveyor & Supply Co.	Car shaker
Noland Company	Quaker conveyor belting
Orville Simpson Co.	Chip screens
Robins & Myers, Inc.	Crane & hoist
Savage, W. J., Company	Butting saw & conveyor
Southern Corporation	Owen pulpwood grapple & chip bucket
Southern Elevator Co.	Building elevators
Southern Railway System	Railroad siding (materials)
Toledo Scale Company	Scales
Transall, Inc.	Belt conveyor machinery
Waterville Iron Works	Chip crusher
Wellman Engineering Company	Pulp wood grapple
Williams Patent Crusher & Pulverizer	Bark shredder
Williams & Wilson, Ltd.	Paper roll handling equipment, roll wrapping machine

by belt conveyor to a surge bin with star feeders and thence to a pair of chip screens. A uniform feed is accomplished by means of the star feeders. Oversize chips fall into a rechipper and are blown back to the surge bin.

Fines from the chippers are carried by a belt conveyor to a hog, which also receives the refuse from the butting saw and the dry bark from the barking drums. After hogging, all of this refuse goes by conveyors past an emergency outdoor storage point to the power plant, where it is burned in a refuse boiler.

Accepted chips from the chip screens are carried by belt conveyors to the chip silos, where distribution into the three silos is accomplished by an enclosed scraper conveyor. Removal of the chips from the silos is by means

of rotary plate feeders which discharge onto the first of two belt conveyors carrying the chips to the digesters. This conveyor carries the chips over a weighing device adjacent to the silos and discharges at the upper floor of the digester building onto a second belt conveyor, equipped with a tripper for feeding the digesters.

In addition to the equipment for handling pulpwood, a complete system for unloading purchased chips from barges and railway cars has been provided, beginning with a concrete pit into which chips can be placed by means of the crane and clamshell bucket, or dumped from hopper car which can be spotted over the pit, using a car shaker to assist unloading. The entire pit bottom is traversed by a drag chain which will carry chips to a belt conveyor, which in turn

will place them in the surge hopper feeding the chip screens. Space for a continuous weighing device has been allowed on the run of the belt conveyor.

### Pulp Storage

Pulp coming from the cutter is delivered to a layboy of the heavy duty type, with the sheets carried on a series of narrow belts. The sheets are ejected from the tape unit to form vertical stacks, accumulated on a belt conveyor and lowering table. When the requisite number of sheets has been accumulated, the table lowers to its bottom position and discharges the stacks onto a conveyor, the table then rises to catch the pulp sheets accumulated during this operation on automatic fingers.

From the layboy, conveyors carry the stacks of pulp through a single downstroke baling press. The press platen is grooved so that stacks of pulp can be tied in the press. The conveying system as a whole comprises a 14 ft swing section and storage belt with wrapper pickup, an air float scale section, and a hinged roller press discharge section; with a gravity roller conveyor to a lowerator stacker which delivers the bales to the basement onto a storage conveyor 30 ft long.

A tile chest with a propeller type repulper receives wet broke from the wet machine, and a dry pulp broke disintegrator is installed in the basement at the cutter to receive dry broke.

A 20-ton manually operated crane serves the wet machine, and a small 5-ton crane the pulp cutting and handling equipment.

Storage for a minimum of 800 tons of pulp bales is available in the basement, from whence they are handled by lift trucks to a train shed for shipment.

### Wood to Grinders

Logs for the groundwood mill are delivered from a water flume conveyor to inclined chain conveyors as already explained, and are discharged onto a flat steel apron charging conveyor to the grinders.

For preparation of groundwood  
(Continued on page 80)

**Use solid film lubricants correctly  
and only where applicable . . .**

# **MOLYBDENUM DISULFIDE in the plant lubrication field**

PLANT engineers are continually confronted with the need for improved lubrication to meet the growing complexity and severe service requirements of industrial plant equipment. Not only are new and better lubricants required, but for practical and immediate purposes, the engineer must select a lubricant from many already available that will best do the job.

In many cases much time, money, and energy are spent in arriving at a proper solution. One must know when it is more ad-

*Most lubrication requirements can be met by well refined oils and greases. However, solid film lubricants can solve certain perplexing problems. Use them correctly and only where fluid lubricants are impractical or won't work.*

vantageous to change the machine design to make the lubricant more effective or to change the lubricant to make the machine more efficient. The balance of these two

trends lies within the scope and cooperation of mechanical and lubrication engineering.

The Class I railroads of the country, with their more than



## **What is Molybdenum Disulfide?**

The source of Moly is a mineral containing about 0.50% molybdenite. The ore is mined principally in Climax, Colorado, the site of the second largest underground mine in the world. Another source is in certain by-products of the copper industry. Traces of molybdenum are found in several copper ores.

Ore is crushed and ground to a fineness that will permit the separation and concentration of Moly through a flotation process. The purified powder is comparable to graphite in appearance, lead-gray in color, with physical properties typical of most metallic sulfides. It has a high melting point and is insoluble in hot and cold water and most organic solvents. However, it will decompose in the presence of strong acids like sulfuric and aqua regia.

**MOLYBDENUM DISULFIDE** has been tested on diesel locomotive cylinder liners and pistons as an aid to better break-in of the assemblies. Dry powder is rubbed onto the parts with a soft cloth, using enough pressure that a thin, polished film remains.

Application here is being made by Wilbur C. Kern, diesel tests engineer of B&O's research department. Piston skirts, grooves, lands, and rings are also treated. Assemblies are then oiled and applied in the usual manner. Mechanics report satisfactory results.

## By ROLAND N. FRACALOSSI

Petroleum Chemist  
Operation and Maintenance Department  
The Baltimore and Ohio Railroad Company, Baltimore, Maryland  
Photos by T. S. BRINKMAN, Technical Photographer, Research Dept.

THE AUTHOR (right) one of B&O's research department chemists, developed the Moly sticks for lubricating diesel wheel flanges. He has also done considerable research work on compounding the various Moly lubricant mixtures now under service tests.

THIS REPORT not only covers three years experience with Moly in the operation and maintenance department of the Baltimore and Ohio Railroad, but analyzes possible applications in diversified Southern and Southwestern industries.

395,000 miles of trackage, approximately 38,000 locomotives, 35,000 passenger cars, and over one and three-quarter million freight cars, depend to a very large extent on the proper use of lubricants to keep their services running smoothly, safely, and on schedule.

Lubricants used range from the very light speed recorder circulating oils on diesel locomotives to the heavy greases for steam locomotive driving journals and crank pins.

The majority of these applications involve the use of "WET" LUBRICANTS, produced in either liquid or semi-solid form. They function primarily as thick film fluids serving to keep bearing surfaces apart through a hydrodynamic, wedging action on the oil film.

The contrasting type, used to a lesser extent, are the "DRY" SOLID FILM LUBRICANTS like graphite, soaps, waxes, white lead, and molybdenum disulfide. The solid film type become effective under boundary, or very thin film conditions of lubrication in which low shear strength and surface tenacity of lubricant are needed to bring about less wear and reduced friction.

### "Moly" Characteristics

The "dry" solid film lubricant type is well represented by molybdenum disulfide, a relative newcomer to the field. For the past two or three years the operation and maintenance department of

The Baltimore and Ohio Railroad Company has been interested in using molybdenum disulfide wherever advantage could be taken of its exceptional lubricating qualities.

This lubrication research work has been under the direction of R. W. Seniff, manager of research; H. D. Plumly is chief chemist, and E. A. Campney, supervisor of lubrication, motive power department.

Molybdenum disulfide belongs to the class of solid lubricants known as the layer-lattice or laminar type, of which graphite is the most familiar example. The relatively weak force between successive layers of molybdenum disulfide molecules permits these layers to slide easily over one another when a shearing stress is applied to a thin film of the material.

The coefficient of friction for rubbed on films of molybdenum disulfide, under moderate bearing speeds and loads, ranges from 0.05 to 0.095<sup>1</sup>. For comparative purposes, Table 2 shows some average friction coefficients for various lubricants at higher pressures, i. e., of the order of magnitude of 100,000 psi.



Together with low friction over a wide range of pressures, Moly has a significant tendency to bind to bearing surfaces. Bonding strength appears greatest when applied to clean, dry steel surfaces. Compared to graphite, the superior film strength and resistance to removal of the Moly film probably account for its lower friction at high loads and its greater anti-welding properties.

### Application Factors

A longer lasting film of Moly results when a dry film is applied to freshly cleaned and dried surfaces. Moisture, grit, grease, oxide films, etc., tend to reduce the bond strength and, wherever excessive, act to prevent any bond from forming.

Other factors leading to improved bonding are:

(1) More porous bearing surfaces—the minute pores serve as reservoirs to supply additional Moly to contacting high spots.

(2) Application to heated surfaces (this helps to open the metal pores) and subsequent cooling.

(3) Pre-treatment of the surfaces with chemical coatings—phosphate coatings for ferritic iron alloys and aluminum alloys. Such coatings provide a highly absorbent porous surface for further treatment with the Moly lubricant, and are extensively used on new parts for better break in operation and on such areas as cam shafts, pistons, thrust washers, or wherever scuffing appears.

Table 2

Lubricant	Av. Coefficient Friction
Stearic Acid	0.029
Molybdenum Disulfide	0.033
Graphite	0.058
Grease (calcium base)	0.082
Machine Oil	0.115
Mica (powdered)	0.305

## (Molybdenum Disulfide in Plant Lubrication)

as a problem.

(4) Mixing Moly with a resinous binder and coating a thin film onto the surface, followed by air drying or baking at elevated temperatures.

(5) Applying Moly in grades of very fine particle sizes to obtain better coverage.

(6) Where practical, the use of a steel wire brush to rub the lubricant into the surface whenever the dry powder is used alone, or else rubbing with a soft cotton cloth saturated with the powder.

Table 3 presents comparative efficiencies of available treating methods for using molybdenum disulfide. The data show some results of the use of Moly to help prevent what is called fretting corrosion, defined as surface failure due to very slight, though rapid, relative motion of closely fitting parts. A typical example on railroads of this type of failure is that found on the backs of main and connecting rod bearings in diesel locomotives.

Table 3

Treatment of surface, steel flat against steel flat	Average number of cycles for first evidence of fretting corrosion
Clean, unlubricated	less than 100
Moly, dusted on	100,000 to 160,000
Moly in oil	700,000 to 760,000
Moly in grease	1,560,000 to 1,620,000
Bonded Moly	9,823,000 to 9,883,000

The method for bonding Moly to give the superior performance shown above consists of heating the steel surface until a dark blue film is formed and then brushing on a mixture of equal parts by volume of Moly powder and corn syrup.\* Bake at 250°C to 300°C until dry, cool, and remove excess coating by rubbing down with fine steel wool and polishing with a clean soft cloth. It is possible to obtain a coating 0.001 inches or less in thickness.

Wherever practical, a bonded film of Moly should provide the longest protection; however, the areas to be lubricated are the determining factors for which method is to be employed. It is not

inconvenient to apply a rubbed on film at fairly frequent intervals, the dry powder will provide essentially as much lubrication.

For areas that are difficult to get to or do not lend themselves to ready dismantling, molybdenum disulfide comes prepared as dispersions in volatile solvents and can be sprayed into the parts, leaving a dry, thin film of Moly upon evaporation of the carrier. Numerous applications involve suspensions of Moly in mineral oils to supplement the lubrication during critical periods of operation, like starting and stopping, high temperatures, and lack of proper oil feed for some reason. Oil and grease mixtures with Moly are used in gears operating under severe loads where the extreme pressure characteristics of Moly are suited to maintaining a solid film at those points where the oil or grease film has been ruptured.

**Stability**—In addition to lubricity, high film strength, and favorable bonding characteristics, molybdenum disulfide has several other qualities desirable in solid lubricants for certain applications. Among these are exceptional chemical and thermal stability.

Moly, as a metallic sulfide, will not dissolve in a wide variety of solvents and resists attack from most chemicals, the notable exceptions being strong acids and gases like chlorine and fluorine.

Moly remains stable in air up to a temperature of 750°F, maintaining low friction coefficients throughout, and in vacuum or in an inert atmosphere it can withstand at least 1100°F. Above 750°F Moly begins to oxidize at a low rate to molybdenum trioxide which is not a lubricant and, alone, will produce high friction forces. On the other hand, petro-

leum based lubricants are not satisfactory for continued use at temperatures of 350°F to 400°F.

Going the other way, Moly has been found to lubricate effectively down to a temperature of -40°F.

**Electrical Conductivity**—We find no absolute agreement to exist on whether or not molybdenum disulfide is a poor conductor of electricity. Investigators have found conflicting experiences. The reasons for the differences are probably twofold.

First, it appears that the conductivity of Moly will depend on the particular conditions under which the film must lubricate; for example, high electrical resistance obtains at low potentials but drops off as the potential rises. Other factors may be sliding velocity, temperature, bearing loads, and surface finish.

Second, it is very possible that impure grades of Moly, which are commercially available, will not behave as the purer grades, and too, variations in particle sizes may account for some differences.

We have found in a test on the B&O RR that when dry Moly powder (about 99% pure) is rubbed on the top wearing surfaces of several lengths of continuous tracks, located in a block circuit set at 0.3 ampere and 0.6 volt, that when a Budd RDC diesel car passed into this block, the current was shunted out through the diesel's wheels and remained completely shunted during passage of the car over the Moly coated rails.

It was determined that the film was still intact after the car's passage. A second run gave the same results. Under these conditions notably high unit loads, the Moly film appeared to behave as a good conductor. The essential thing to bear in mind and determine is how your particular film behaves under the specific operating conditions for which its use as a conductor or insulator is contemplated.

**Corrosion**—As a solid film lubricant Moly, used alone, does not appear to either initiate or prevent corrosion. Where atmospheres run humid and rusting is a problem, the dry rubbed on film will offer little protection. This lack of anti-corrosion properties is not restricted to Moly alone since most solid lubricants, including graphite, behave similarly in this respect. A bonded film of Moly offers better protection since the surfaces are better sealed.

Where corrosion of steel surfaces is a real problem, of course, dry solid lubricants are not the answer, and petroleum based lubricants with proper anti-rust additives should be used.

\* A number of commercial materials have been developed which use other types of bonding agents. Check Technical Note 2802, "Bonding of Molybdenum Disulfide to Various Materials to Form a Solid Lubricating Film" available from NACA, 1512 H Street, N.W., Washington 25. D.C.—Ed.

## B & O Service Data

Our attention was first directed to Moly during attempts to find a material that would cut down the wear of diesel locomotive **wheel flanges and track** during heavy freight haulage over curved track.

Normally, multiple wear wrought steel diesel wheels can be expected to last from 125,000 to 150,000 miles before the wheels are shopped for their first turning. These mileages represent service that has not been severe; that is, included very little heavy operation over curved track or pusher service on hills. Our experiences with severe service have resulted in new wheels being shopped after accumulated mileages from 70,000 to 80,000 miles.

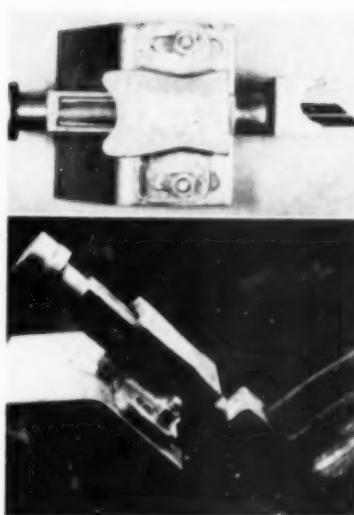
The use of oil has not shown any real improvement. It was felt that a lubricant, like Moly, of high film strength was required to reduce the abrading action of the wheel flange as it slices into the rail on an angle when moving around curves. The sharper the curve, the greater the angle of contact, and the greater the wear.

There followed the application of a cast iron lubricator assembly, housing a 10" solid stick of bonded molybdenum disulfide that is mounted on the truck frame of a locomotive so as to bring the lower end of the Moly stick into continuous contact with the wearing area of the wheel flange.

One advantage of this type of lubricator is that the lubrication is dry and, unlike oils or greases, does not accumulate abrasive material like sand, cinders, or road dirt. Note applicational photos. The Moly sticks are renewed about every six weeks. Developed on the B&O RR, the holder and stick have provided a simple, inexpensive, more effective means of reducing wheel flange wear.\*\*

Though considered still in the experimental testing stage, performance data from twelve equipped diesel locomotives (wheels new when applied) indicate practically no flange wear in over one year, or about 80,000 miles of operation.

\*\* National Aluminate Corporation has worked closely with the B&O on flange lubrication with Moly and is marketing the Nalco Flange Lubricator.—Ed.



**THIS DEVICE** has provided a simple, inexpensive, more effective means of reducing wheel flange wear. Photos show a full scale model of the B&O developed lubricator assembly and its actual service application to a diesel locomotive.

Assembly, housing a 10" solid stick of bonded molybdenum disulfide is mounted on the truck frame of a locomotive so as to bring the lower end of the stick into continuous contact with the wearing area of the wheel flange. Performance data from twelve equipped locomotives (wheels new when applied) indicate practically no flange wear in over a year.

Advantage of this type of lubricator is that it is dry and does not accumulate abrasive material like sand, cinders, or road dirt.

For over a year now a service test has been maintained on the application of Moly to railway passenger car body and truck center **castings and brake rigging pins and bushings**. The advantages of dry Moly lubrication of center castings, compared to oil, are:

(1) The flat sliding surfaces tend to squeeze out an oil film, whereas the solid film is more tenacious.

(2) Many center castings do not prevent road dirt from entering and sticking to wet oiled surfaces, forming a natural grinding mixture of oil and grit. With dry

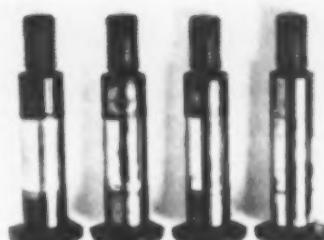
Moly, it has been found, the contamination is slight and fine in nature, making for cleaner and longer service between lubrication periods.

One of the photos shows several passenger truck brake rigging pins after about 100,000 miles of service, having been lubricated with a suspension of fine Moly powder in a lightweight oil. Wear of these pins ranges from .001" to a maximum of .006" and the wear has been uniform around the circumferences. Pins, lacking lubrication, become frozen in their bushings and wear locally, forming grooves that have been noted as deep as  $\frac{1}{8}$ ".

Turning of these pins in their bushings is an intermittent operation, occurring during application and release of the air brakes. Retention of lubricating oil alone is difficult. The Moly provides a solid lubricating film that can be thought of as "taking over" when most of the oil is lost.

Though we have used oil as the carrier for Moly, to insure adequate penetration to all pin surfaces without having to dismantle parts, Moly sprayed on in a volatile solvent would work as well. Another method would be to either

(Continued on page 100)



**BRAKE RIGGING PINS** after about 100,000 miles of service. Turning of these pins in their bushings is an intermittent operation, occurring during application and release of air brakes. Retention of lubricating oil alone is difficult.

Pins were lubricated with a suspension of fine Moly powder in a lightweight oil. Wear ranges from .001" to a maximum of .006" and it has been uniform around the circumference. Pins lacking lubrication become frozen in their bushings and wear locally, forming grooves that have been noted as deep as  $\frac{1}{8}$ ".

**Largest of Its Kind—**

# **AUTOMATIC REFRIGERATION EQUIPMENT**

## **Cools 2,600,000 Cu Ft Florida Warehouse**

**By A. T. LOHKAMP**

Superintendent of Steam and Refrigeration Plants  
Pasco Packing Co., Dade City, Florida

**T**WO MILLION six hundred thousand cubic feet of refrigerated warehouse was completed and put into operation at Pasco Packing Co. of Dade City, Florida, nearly a year ago. The refrigeration equipment in this sub-zero storage warehouse is entirely automatic in operation.

With a year of operational experience, it is now safe to describe and evaluate this operation. With temperatures in the cold rooms held at from fifteen to eighteen degrees below zero, the compound system of compressors is used. The refrigerant is ammonia.

**C**OMPRESSORS of correct sizes and speeds to produce the required tonnage of refrigeration to suit our conditions were selected. An automatic selector increases or decreases refrigeration tonnage according to demand set up by conditions in the freezer.

The demand for an increase or decrease in capacity is set up by using a temperature sensing bulb installed in a container of liquid in the suction line. The container for the liquid is a pipe tee with a pipe cap welded onto the side outlet of the tee. With the side outlet of the tee and cap turned down, enough liquid is contained to fully cover the temperature sensing bulb of the instrument.

Liquid level is maintained by using a Sporlan Levelmaster liquid level controller of one-ton capacity. Since the temperature of the liquid will always correspond to the suction pressure, this method of control is more satisfactory than trying to control from suction temperature only. It was feared that suction temperature would fluctuate due to superheat. The above method insures closer

control than would be had by the insertion of the temperature sensing bulb directly in the line.

The temperature sensing instrument is an Electr-o-Vane controller manufactured by the Brown Instrument Division of the Minneapolis-Honeywell Regulator Company. This controller has a double contact; one operates contactors to start additional machines when the suction temperature increases beyond the set point, and the other operates contactors in the Cutler-Hammer step selector to shut down machines if the suction temperature decreases to the low temperature set point.

### **Step Selector**

The Cutler-Hammer step selector increases or decreases the number of machines in operation as the Electr-o-Vane controller dictates. The Electr-o-Vane controller is the heart, but the Cutler-Hammer selector is the pulse of the operation. In one cubicle are all of the contactors and timers to control the four Frick Booster Compressors and four high pressure compressors. There are ten

steps of capacity ranging from thirty-five tons to two hundred sixty-five tons.

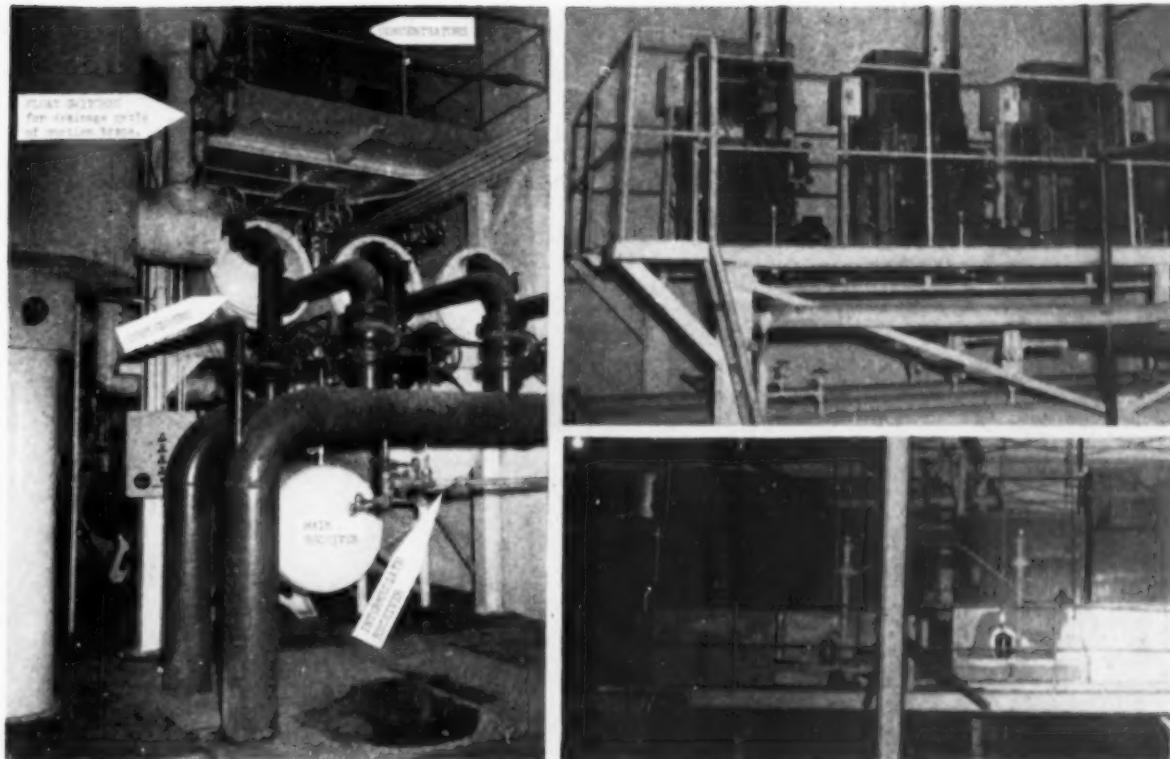
This selector contains timers so that the capacity will be increased no oftener than every thirty minutes. This prevents a lot of unnecessary starting of machines when there may be only a brief surge in the suction pressure. By allowing a thirty-minute interval before the next higher step cuts in, the machines have a good chance to pull the suction pressure down to normal without adding more machines.

In case of power failure, all machines that are running when the power fails, restart when power returns. These machines then operate for thirty minutes before another step is added. This prevents starting of extra machines to pull down the increase in suction pressure caused by the shutdown. At the end of the thirty-minute interval, this surge of pressure is usually pulled back down to normal and there is no need to add machines.

### **Flooding Prevented**

A solenoid valve in the liquid line closes when power fails and does not reopen until the first booster compressor starts. By this simple control, the flooding of evaporators is prevented and liquid slop-over from the evaporators is minimized.

As further protection against liquid entering the booster suction, a suction trap is installed which traps any liquid entrained with the suction vapor. Heavy, super-saturated vapors, if allowed to enter the machine suction, will break down lubrication, use more power due to increased friction, break valves, and in cases of severe carry over of liquid, will wreck machines.



VIEWS SHOWING ARRANGEMENT OF REFRIGERATING EQUIPMENT

**ABOVE**—Liquid concentrators are on a platform over the condensers. Float switches in header on side of suction trap control the drainage cycle.

**UPPER RIGHT**—Niagara No-Frost concentrators evaporate moisture absorbed by the No-Frost liquid.

**LOWER RIGHT**—Side view of evaporators mounted on a platform above product storage space.

The suction trap contains pipe coils through which the liquid ammonia passes on its way to the evaporators. When the trap fills slowly, these coils serve to evaporate the collected liquid in the trap which in turn chills the liquid within the coils so that it reaches the evaporators as cold as possible. Cold liquid supply to the evaporators decreases the amount of flash gas, thus lessening the load on suction lines and decreasing pressure loss in the suction lines.

#### Float Switch Protection

When the suction trap fills too rapidly, as it may in case of float valve failure, it is arranged to dump the collected liquid into the large liquid receiver by using gravity flow, an intermediate receiver, float switches and solenoid valves. On the side of the suction

trap is a header of two and one-half inch pipe. On this header are mounted three Alco float switches. The lower two of these are wired so that the following takes place.

1. When suction trap fills with liquid to the level of the second float switch (from the bottom) the gravity drain solenoid opens. (The pressure equalizing line from the top of the intermediate receiver to the top of the suction trap is already open so that pressures are equalized.)

2. After a timed period of draining, the equalizing valve and the drain valve close, and a solenoid opens in the equalizing line from the high pressure discharge header to the top of the intermediate receiver. At the same time a solenoid opens in a gravity drain line between the intermediate receiver and the main receiver. Pressures equalize and drainage continues for a timed period.

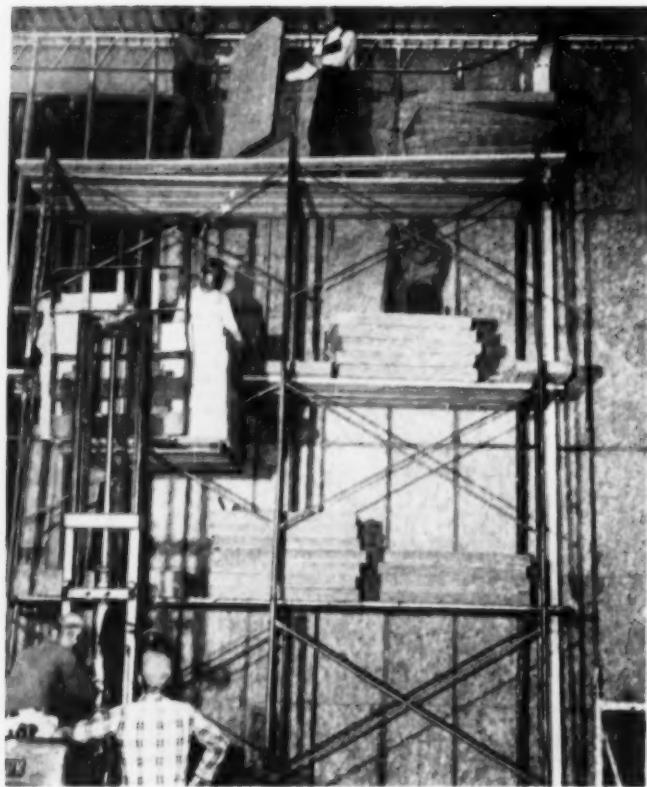
3. After the timed period has elapsed, the two valves (high pressure equalizing and high pressure drain) close and the equalizing solenoid valve in the line from the top of the

intermediate receiver to the top of the suction trap opens. Pressures between the suction trap and the intermediate receiver are then equalized and the cycle is ready to begin again.

If either of these lower float switches fail to function properly and the suction trap continues to fill until the top float switch makes contact, it will, upon making contact, shut down all compressors and sound an alarm in one of the other compressor rooms so that the attendant can check the operation. A small red light will appear on the Cutler-Hammer step selector front to tell the maintenance men what the trouble is. The suction can be manually drained and the system will automatically start as explained above.

#### Compressor Protection

All compressors have low-lube pressure and high temperature cut



Two layers of Fiberglas insulation, each four inches thick, were applied to the walls. The roof is nine inches thick and the floor eight inches.

out switches. If a high pressure machine is cut out for either lubrication failure or high temperature of the cooling water, its companion booster compressor will also cut out. The starters are so interlocked, electrically, that a booster compressor can not run unless the companion high pressure machine is running.

Mercoid pressure switches are used to cut off all refrigeration compressors when the high pressure discharge exceeds a preset maximum of 225 psig or when the suction to the booster pulls below a preset minimum of eight inches of vacuum equivalent to 40 degrees below zero.

#### Additional Protection

Further protection of equipment is provided by having a water pressure differential switch with pressure taps on water flowing into and out of the condensers.

The booster compressors are provided with ammonia cooling of the heads so there is no danger of freezing a water jacket if the

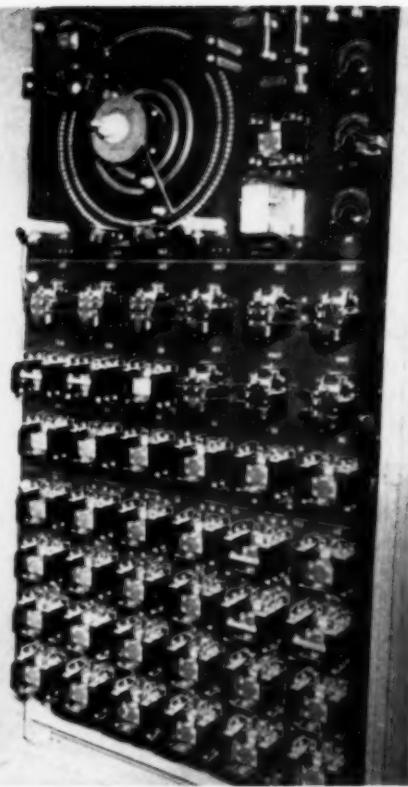
other precautionary measures fail.

#### Evaporators

The system contains a gas and liquid interstage cooler. Ammonia flowing from the receiver to the evaporators flows through a cooling coil in the suction trap. Pre-cooled liquid then flows to the cold room evaporators.

The cold room evaporators are of the Niagara Blower No-Frost type. In the evaporators, the No-Frost liquid circulates continuously, spraying over the coil surface, absorbing any moisture that would otherwise freeze to the coil and decrease efficiency.

These coils work at their maximum efficiency at all times and do not require oversizing to allow for loss of efficiency due to frost accumulation. Because of this factor two number 685 No-Frost evaporators were considered ample in each of the four rooms. These evaporators are located in the center of the room and elevated to allow free movement of fork lift tractors beneath them.



Inside of Cutler-Hammer step selector, showing timers, contactors, and motor driven selectors.

The evaporators are set back to back on the platform.

Each evaporator has four coil sections. Since operating conditions differ from season to season, and refrigeration requirements vary according to work done in the room, lights used, amount of outside air entering, etc., it was thought advisable to separate these coils so the top two coils of each unit were connected to a common surge drum with independent liquid supply and separate suction headers.

By using a thermostat control to actuate a solenoid valve in each liquid supply line, it is possible to isolate the top half of the coils when the room temperature drops to seventeen degrees below zero and cut it back in when the temperature rises to fifteen degrees below zero. If the temperature drops to twenty degrees below zero, both halves cut out until the temperature rises again to seventeen degrees below zero when the bottom half again cuts into service.

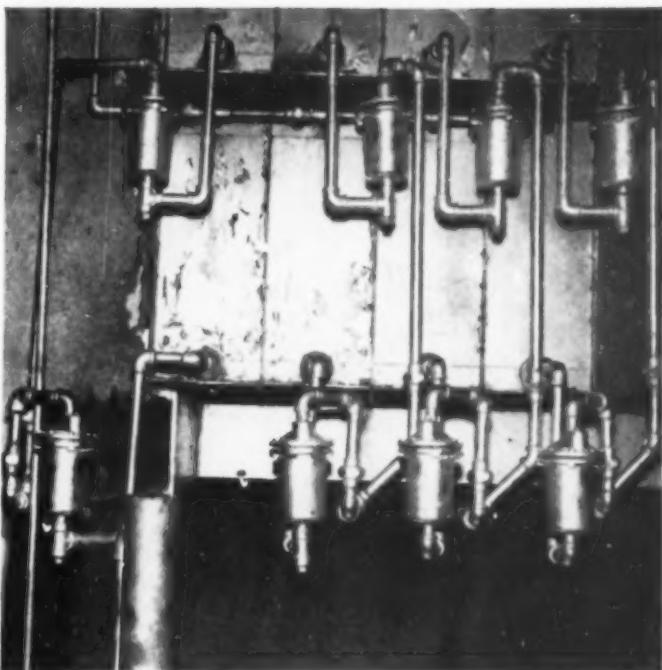
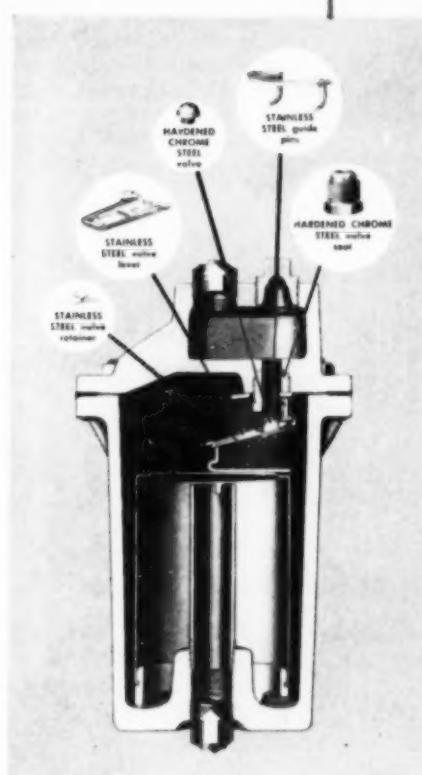
This device has successfully

# You will always get better results by putting a Steam Trap on each Steam Coil, Chest or Unit

## EXAMPLE

Dryer Temperatures at Guelph Creamery, Guelph, Ontario.

WITH GROUP TRAPPING (5 steam traps for 10 coils)	225°F
WITH BLOW-THROUGH (no steam traps)	250°F
WITH ARMSTRONG UNIT TRAPPING (10 traps—one on each of 10 coils)	309°F



● The example at the upper left is simply one of thousands that bear out the benefits of "Armstrong Unit Trapping".

When you analyze it, the reason is quite obvious. No two steam coils, chests, chambers or machines will condense steam at exactly the same rate under operating conditions. There is a greater pressure drop in the units that condense the fastest. Steam will backflow through a common drain line from a higher pressure unit to a lower pressure unit. This blocks off flow of air and retards condensate flow from the lower pressure unit. On the other hand, if you separate each unit with its own trap, that can't happen.

You will *always* get higher temperatures and lower production costs with unit trapping. Ask your Armstrong Representative about it, or write:

**ARMSTRONG MACHINE WORKS**  
806 Maple Street, Three Rivers, Michigan

### FREE—STEAM TRAP BOOK

If you don't have a copy of the 44-page Armstrong Steam Trap Book, we'll be glad to send you one. No obligation.



# ARMSTRONG STEAM TRAPS

## (Automatic Refrigeration Equipment—Continued)

maintained cold rooms at the desired temperatures and enabled us to use a common suction header from all evaporators with suction maintained at a constant pressure. Without resort to some such division of coil surface, temperatures would fluctuate badly or suction pressure would have to vary to suit the needs of individual rooms.

Dividing coil surface of each unit, as has been done in this case, allows equal distribution of cold air to all parts of the room. Refrigeration effect could be halved by isolating one evaporator at a time, but this would cause cold air to be blown to one half of the room only, and might cause uneven temperatures.

There are no air ducts from these evaporators. The circulating fans of the Niagara Blower evaporators are sufficient to supply ample air distribution to all parts of the room. Each of the four rooms is 137 feet by 181 feet by 27 feet high, inside dimensions.

### Liquid Concentrators

The Niagara No-Frost liquid concentrators are located in the engine room on a platform above the condensers and receivers. As the No-Frost liquid absorbs moisture, its volume is increased. A one-half inch increase in liquid level in the sump of the evaporators actuates a float switch which starts a small pump to force the liquid back to the concentrators in the engine room.

Each concentrator contains 20 kw in electric heaters over which the No-Frost liquid is sprayed to drive off the water. Temperature is maintained at 152 F.

The warm liquid flows to a sump through a heat exchanger where it is cooled by the liquid being pumped from the cold rooms to the concentrators. In turn, the cold liquid from the rooms is pre-heated before entering the concentrators.

From the sump, the concentrated No-Frost liquid is returned to the room evaporators by another small pump. There is one concentrator for each room or for each two evaporators.

Proper concentration of the No-

Frost liquid must be maintained to insure against freezing of moisture on the coil surfaces. To do this it is only necessary to check the liquid strength once a week. By operational experience we have found that the specific gravity of the No-Frost liquid is not too critical. Weekly checking is ample to maintain proper concentrations.

### Storage Building

The cold storage building is constructed of concrete block. There is a twelve-inch red brick fire wall between each two adjoining cold rooms and between the engine room and the first cold room either side of the engine room. The engine room is centrally located at the back of the building having a floor area of 40 feet by 100 feet. Immediately to the front of the engine room is a room 40 feet by 82 feet which is used for labelling frozen product. Above the labelling room is space for carton and

other storage. Dressing rooms for cold storage personnel, cold storage offices and rest rooms are also on the second floor of this section.

Fiberglas insulation is used throughout the cold storage warehouse. Vapor Barrier paper applied over a sprayed adhesive lines the interior of each room. Inside this vapor barrier paper and adhesive combination is eight inches of fiberglas insulation. Girts and studs are necessary to support the wall insulation. Room interiors are finished with perforated masonite nailed to the studs.

The vapor barrier, adhesive combination has a permeability of less than two-tenths perm. The fiberglas has very low resistance to moisture infiltration and the perforated masonite allows free flow of moisture (entrained with any infiltration of air) into the room to be picked up by the No-Frost liquid. By using a very good vapor barrier at the building wall little air is allowed to filter into the insulation. However, any that does has relatively free access to the refrigerated space with no intervening or secondary vapor barrier.

### PRINCIPAL EQUIPMENT

Compressors	Frick Company
Pressure Vessels	Frick Company
Solenoid Valves	Refrigeration Specialties Co.
Liquid Level Controllers	Sporlan Valve Co.
Expansion Valves	Sporlan Valve Co.
Instrumentation	Minneapolis-Honeywell Regulator Co.
Pressure Safety Switches	Merco Corp.
Temperature Safety Switches	Merco Corp.
Evaporators	Niagara Blower Co., No-Frost type and Recold
Motors & Starters	Cutler-Hammer, Inc.
Step Selector	Cutler-Hammer, Inc.
Motors for Compressor Drives	Allis-Chalmers Mfg. Co.
V-Belts	Gates Rubber Co.
Insulation	Owens-Corning Fiberglas Corp.

## Demineralization at Gulf States Utilities

(Starts page 58)

The second system provides for automatic regeneration with diluted 93 per cent sulfuric acid in three successive concentrations, but without provision for reclaiming. Normally, regeneration with all sulfuric acid and reclamation will be used.

Two separate regenerator systems for the anion exchange units are provided as follows:

The first system includes both the introduction of reclaimed dilute caustic soda followed by diluted 25 per cent caustic soda, giving two-step regeneration with concentrations of approximately 3.5 per cent and 10 per cent, or for the use of diluted 25 per cent caustic in two successive concentrations.

The second anion regenerating system is operated manually. All other regeneration systems are automatic with provision for manual operation. New 25 per cent caustic

is discharged by the delivery pump used for the automatic system, diluted with cold water in a mixing fitting and then delivered direct to the header and to the unit being regenerated.

Surface type heat exchange equipment and a warm water storage tank, including necessary pumps, controls and accessories are included to provide warm water for caustic dilution and for circulation through heating coils in the concentrated and reclaimed caustic storage tanks. Special precautions are taken to avoid overheating the

regenerator under any conditions.

Well water from the cation influent header is used for diluting both acid and caustic regenerator chemicals.

All automatic regenerating systems are arranged to establish flow of dilution water to the mixing chambers before introduction of concentrated regenerator chemical, and to continue the flow of dilution water after chemical flow is stopped, to rinse the delivery lines and leave them filled with water only when idle.

The flows of hydrochloric acid and dilution water are set manually and measured by indicating flowmeters. Flows of sulfuric acid and dilution water are set automatically to adjust the concentration and total flow as required for step-wise regeneration. Rates of flow of caustic soda and dilution water are set manually. Warm water is automatically blended with cold dilution water ahead of the mixing chamber. A temperature switch sounds an alarm in event of excessive regenerator temperature.

A number of concrete water pools and overhead showers are provided for quick wash-off by workmen in event of accidental contact with regenerator chemicals.

#### **Wastes and Reclaimed Chemicals**

The flow of wastes to disposal facilities or reclamation is shown in Fig. 6.

Since the daily quantities of acid in wastes exceeds considerably the caustic in wastes discharged from the demineralizing plant, provision is made to utilize waste alkaline sludge from the first stage, clarifiers in the older treating plant for the first step in neutralizing the acid. Provision for the use of lime slurry is included also, should it be found necessary.

#### **Controls and Instruments**

A total of 14 panel boards are provided in the demineralizing plant for the instruments and controls. The small panels, close to exchange units, each serve the adjacent two units. Mounted thereon is a program switch for each unit which operates all main valves



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## Demineralization at Gulf States Utilities

(Continued from preceding page)

of the manifold and initiates operation of the regenerating cycle when backwashing is finished.

Two of the larger boards control automatically the regeneration cycles, one each for anion and cation sections. The remaining two large boards contain instruments recording quality of water, one board each for cation and anion sections, separate records of pH and conductivity being made for each exchange unit in the plant. The recording flame photometer is mounted on the cation board. The two laboratory wall tables, located in front of these boards, provide working space for conducting check and routine tests associated with plant operation.

### Operating Procedures

Operating procedures provide for thorough backwashing, three changes of water, and for full regeneration of each cation and anion unit to obtain their maximum output, thus taking advantage of information developed in the pilot plant tests. This is more economical chemically because it lends itself readily to the reclaimed chemical cycle. It also decreases the number of regenerations for a given period of time.

The use of 10 per cent acid and 10 per cent caustic for regeneration gives more complete regeneration and better quality effluents and it also reduces the time for introduction of these chemicals into the units. Any use of low strength chemicals lowers the strength of the reclaimed chemicals. This in turn lowers the effectiveness of regeneration.

These procedures permit operating with one operator per shift instead of two when the plant is at full capacity.

Other advantages of complete regeneration are better average quality water due to less frequent periods of high initial sodium and silica as the units enter service, plus slightly less conditioning water and somewhat better economy.

Disposal of the waste acid and waste caustic involves one deten-

tion tank for waste acid and one for waste caustic. These tanks are to convert nonsimultaneous intermittent flows of waste to uniform slow continuous flow rates. Consequently, effective neutralization may be accomplished with the continuous flow of carbonate sludge from the older water softening and clarification plant.

The waste acid first meets the carbonate sludge with release of considerable  $\text{CO}_2$  followed by aeration for mixing and removal of  $\text{CO}_2$ . The waste alkali is then added. Calculations and actual pilot plant tests show that this procedure gives the maximum utilization of available alkali for neutralization of the acid.

### Performance

The performance of the plant checks very closely with the data and experience obtained with the pilot plant.

The cost of treatment, using the reclaimed cycle, approaches 6 cents per 1,000 gal. Chemical levels and effluent quality on both cation and anion units are as predicted.

## Materials Handling at Bowaters

(Starts page 66)

there are eight grinders, complete with governors and hydraulic control equipment. Each of these grinders is driven by a 4500 hp synchronous motor, equipped with water coolers.

There are two 20-ton cranes; one for servicing the grinders and the other for the grinder motors.

The groundwood stock preparation equipment consists of two bull screens, consistency control equipment, four primary centrifugal screens, and one secondary centrifugal screen.

A hammermill breaks up bull screen rejects. For further treatment of these rejects and the screen tailings, three drainers and disc refiners are provided.

Ten 12 in. primary Dirtec and ten 4 in. secondary Dirtec units

Expected kilogram exchange capacities of 35 kg per cu ft for the cation and 20 kg per cu ft for the anion are being realized. Unexpected release of foul hydrogen sulfide in the vacuum degasifier made it necessary to pipe the tertiary jet cooling water to the swamp.

The boiler was operated at 600 psi gage for several weeks to reduce the silica in the boiler water before raising the normal operating pressure to 1,500 psi gage. Boiler water silica at the end of this period was 2.5 ppm  $\text{SiO}_2$  with a light blowdown.

Only future operation at full load will tell how trouble-free the boilers and turbines will be as regards water and steam conditions.

### ACKNOWLEDGMENTS

As is normal in the design of all power plant facilities, particularly where many new aspects are involved, the completed design of this plant is the result of the united efforts of the engineering organizations of the general contractors, STONE & WEBSTER ENGINEERING CORPORATION, the equipment suppliers, THE PERMUTIT COMPANY, and the purchaser, the GULF STATES UTILITIES COMPANY.

The chemical laboratory men are especially cited for their cooperation and fine work. Particularly helpful was the patience, confidence, and encouragement given by MR. J. A. REICH, Production Manager, and MR. R. J. ROBERTSON, System Superintendent of Production of Gulf States Utilities Company, who made this work possible.

The men in the Stone & Webster Engineering Corporation, The Permutit Company, and representatives of the resin manufacturers were all extremely cooperative and helpful.

remove the shives and dirt from the groundwood pulp. Six groundwood deckers thicken the stock after the Dirtecs for storage.

### Paper Handling

A large machine room crane is provided for servicing the two paper machines and on each machine there is an individual electric crane for transferring rolls from the reel to the winder.

Newsprint rolls are discharged from the winder onto floor type transfer conveyors, where they are rolled into an automatic roll wrapping machine. From the roll wrapping machine the rolls go directly to two roll headers, each equipped with scales. Rolls then go to an 18-hour storage space on the second floor. A conveying sys-

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## Handling at Bowaters

(Continued from page 80)

tem conveys and lowers rolls from this storage on the second floor to either the storage below or to a car loading conveyor running the full length of the shipping platform.

The floor and platform conveyors are floor flush type and rolls can be rolled off at any desired place for loading to railroad cars by fork trucks. Storage for a minimum of 1800 tons of news rolls is available in the basement, as well as facilities for loading trucks for local shipment.

In front of the bark boiler above the firing aisle is a bark storage bin of 6000 cu ft capacity. Bark is fed from this bin into the spreaders by screw conveyors placed across the bottom.

For the handling of salt cake a pneumatic system is used to unload cars and deliver either into storage or the feed hopper of the unit.

The lime reburning plant consists of a rotary lime kiln, 9 ft by 250 ft, with four supports. At the feed end, a vacuum mud filter and a slurry feeder provide a constant rate of feed. Fuel for the kiln is natural gas. The design capacity of the kiln is approximately 40 tons per day. The kiln can be

operated up to a capacity of approximately 125 tons per day to handle peak loads and additional production. Limestone is used as makeup and is introduced by a table type feeder to the kiln feed conveyor. The limestone is stored in an overhead storage bin with a capacity of 47 tons, and provision has been made for a ground storage of approximately 100 tons. The limestone system consists of a track hopper, drag chain conveyor, bucket elevator, and necessary chutes.

### KEY PERSONNEL AT PLANT

K. O. Elderkin	Vice President & General Manager
V. J. Sutton	Mill Manager & Assistant to General Manager
C. E. Odyke	Comptroller & Treasurer
D. W. Timmins	Secretary & Assistant Treasurer
B. R. Edgar	Woods Manager
G. R. Koone	Industrial Relations Manager
R. B. Reid	Purchasing Agent
W. H. Jonbort	Traffic Manager
E. L. Cowan	Chief Engineer
W. J. Parson	Paper Mill Superintendent
T. C. Bannister	Sulphate Superintendent
J. N. Swarts	Technical Service Superintendent
Otha W. Waddingham	Mechanical Superintendent
R. R. Street	Power & Steam Superintendent
J. J. Moynihan	Groundwood Superintendent
R. L. Martin	Finishing & Shipping Superintendent
C. J. Maki	Woodhandling & Yard Superintendent
M. J. Osborne	Electrical Superintendent

### General Facilities

A two-story building for shops and stores is located on one side of the grinder and stock preparation rooms parallel to the servicing tracks. The upper floor with about 20,000 square feet is used as the shops, and the basement with the same area for stores. At one end of this building where

access is available by cranes from the machine room there is a roll grinder, 42 by 280 in.; provision also being made at the same point for loading out to cars by overhead crane. An 8000 lb elevator serves this building.

## Lighting at B & W

(Starts page 64)

lateral travel and vertical hoisting), operators have uniform and easy visibility of all portions of the working area 30 ft below.

In addition to the Paris plant, B&W's Boiler Division has established several other plants, all in the South, during the past three years. These are located in Brunswick, Ga.; West Point, Miss., and Wilmington, N. C. The company's Refractories Division also has had a plant in the South, at Augusta, Ga., for 25 years.

## Foreman Training Begins at Home

A DESIRE for more effective use of manpower in the production process prompted the House of Lance, Charlotte, N. C., manufacturers of peanut and bakery food products, to undertake a program of foreman training which includes at least one unique feature.

As a part of the program, foremen and supervisors spend six weeks in the company's personnel department observing and, later, taking part in its functions. They spend at least one hour each day in consultation with the personnel director, who discusses personnel and supervisory techniques and problems, and the company's policy toward them. The foreman is encouraged to read material on the same subjects from the department's lending library.

Basic to this program is the belief that the more each foreman knows about the handling of people, the better able he will be to utilize effectively the manpower in his department.

Close-up view of the wet end of the paper machine.



During their period of training, foremen observe personnel staff members as they interview job applicants. Later they interview some applicants themselves. The hiring function has traditionally been left primarily to the company's personnel department, but foremen have cooperated by giving details on the job to be filled when submitting requests for new employees. Now, it is felt, with personnel staff members and foremen better acquainted with the needs and problems of each other, the selection procedure will be even further improved.

Foremen are also encouraged to help handle the questions and problems which employees from all over the organization bring to the personnel department. Other personnel functions, such as handling of insurance programs and retirement plan, publication of the company news sheet, and compiling of records, are now better understood and more clearly interpreted by foremen, and are consequently becoming more and more effective.

The program also has the distinct merit of broadening the foreman's overall view of his company. This temporary transfer from line to staff duties brings him closer to management, and enables him to better interpret company policies and functions.

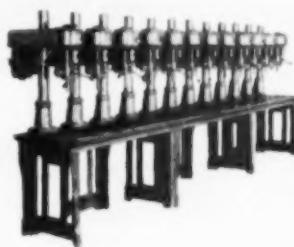
## Chain Reaction

One advantageous by-product of this program is the experience gained by the foreman's assistant, who takes over during the time the foreman is training in the personnel department. This is valuable experience for the assistant, and at the same time gives the foreman an opportunity to observe him in action. The assistant, in turn, must call on another member of the department to act as his assistant, and so a chain of valuable training experience results.

The House of Lance, believes that this aspect of their foreman training program is reaping results for all employees, making for better understanding, improved communications, and more efficient use of its manpower resource.

By A. L. BECHTOLD, public relations director, Lance, Inc., Charlotte, N. C.

Add as many spindles as you want — and multiply your savings — with this combination designed for economical production drilling. You will note, as indicated by the drawing and photos, that you may combine *any number of Table Sections* to accommodate just the right



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(See Table Sections - 12 Drilling Units)

number of 20" LIGHT-HEAVYWEIGHT Drill Press Spindles to fit the specific jobs you have to do.

This **LIGHT-HEAVYWEIGHT** combination gives you the maximum in flexibility and economy. The number of intermediate Table Sections determines the number of Spindles which can be varied to fit the nature of your work and output requirements. Best of all, you avoid the heavy expenditure for costly, specialized equipment.

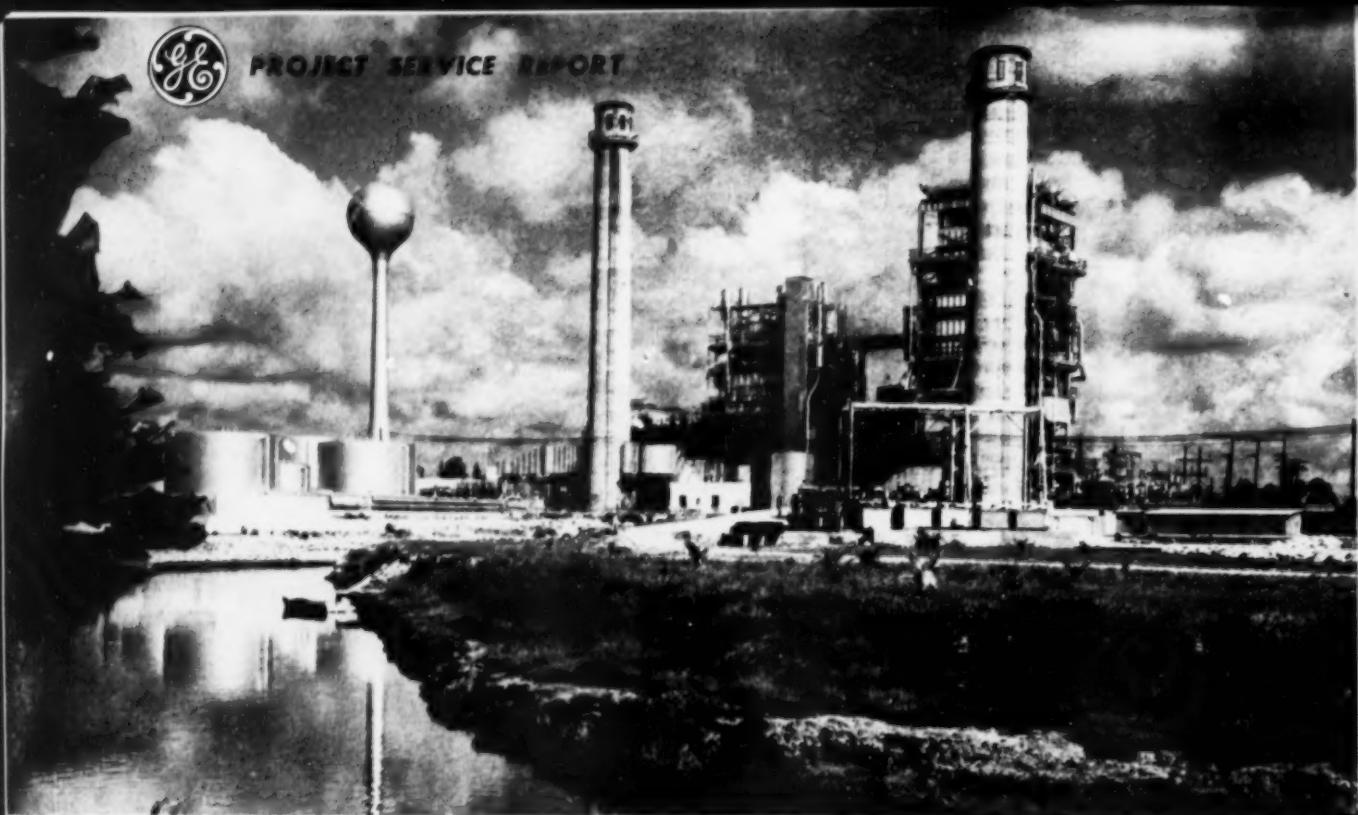
Ask your Distributor to demonstrate the performance advantages of Walker-Turner LIGHT-HEAVY-WEIGHT 20" Drill Press units. He has them in stock as Bench Models and Floor Models, and can specify Multi-spindle Models with exactly the number of drill heads you need.

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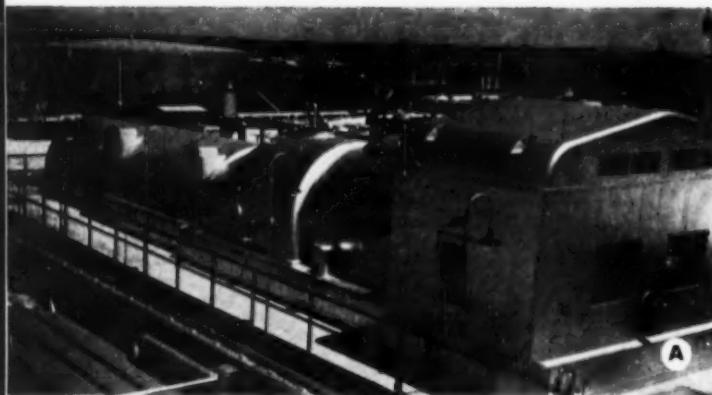
## PROJECT SERVICE REPORT



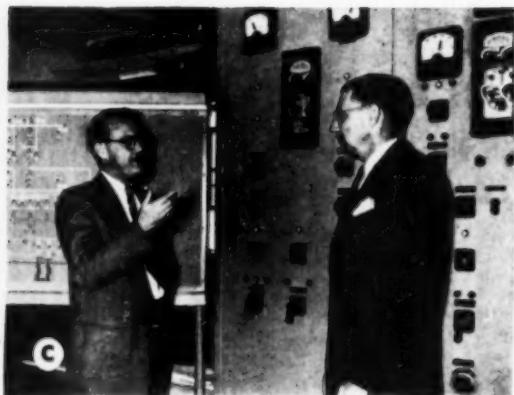
**TWO G-E TURBINE-GENERATORS PRODUCE 130,000 kw at Cutler Station of Florida Power and Light Co., Miami, Fla., to handle rapidly increasing industrial and residential loads of this growing area.**

Throughout construction, F. P. & L. and their consultants, Ebasco Services, Inc., received consolidated project reports on manufacturing details and shipping dates of all major electrical equipment.

# General Electric helps Florida P.&L. keep



A



C

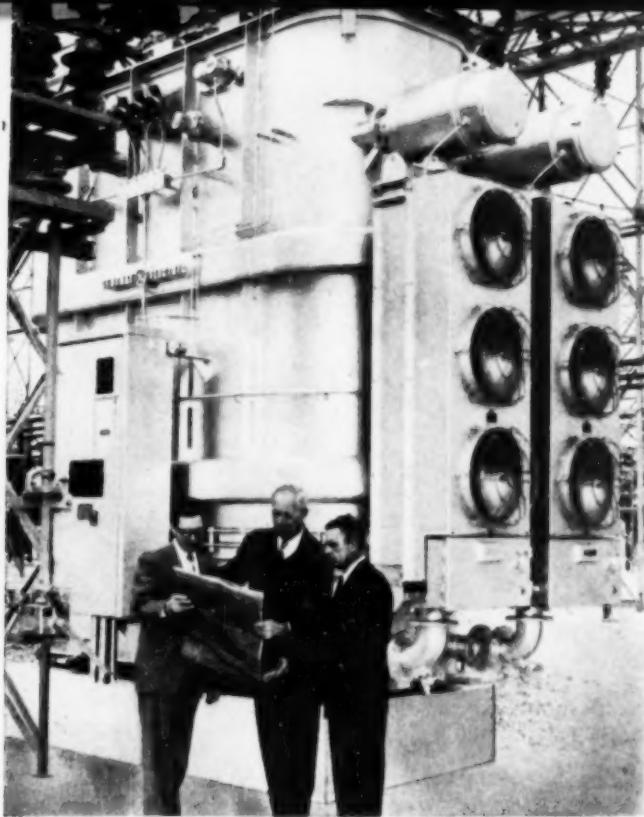


B

**A TURBINE-GENERATOR, 80,000 kilowatts, the newest G-E unit at Cutler Station, is tandem-compound, double flow, 3600 rpm. Manufacturing time was kept to a minimum since early planning reserved factory space.**

**B ADDITIONAL CAPACITY** is already on order for F. P. & L. to meet Florida's rapid growth. President R. H. Fite (center) of F. P. & L. discusses the installation of a new 135,000-kw G-E unit (going in service next year) with J. W. Lacy, G.E., and H. V. Street, F. P. & L.'s Chief Engr.

**C SYSTEM REQUIREMENTS** are discussed by F. P. & L.'s H. W. Page (left), Manager Power Supply and George Kinsman, Vice President. Early planning with G-E Project Team helped F. P. & L. meet growing power requirements on time.



**MAIN POWER TRANSFORMER** is forced-oil air-cooled, 42,500kva. L.H. Hill, Jr. (left), G-E Transformer Specialist, E.J. Pearce, Station Supt., and J.W. Lacy, Jr., G-E Office Manager, discuss time saved by upright shipment in one-piece tank.



**EBASCO SERVICES** confers in New York with G-E Sales Engineer W. Luxton. Left to right: E.A. Ritchings, Chief Mechanical Engineer, W.H. Colquhoun, Engineering Manager, Mr. Luxton, and H.L. Lowe, Chief Electrical Engineer.



**OUTDOOR SWITCHGEAR** connections are reviewed by E.A. Bird, Ebasco Const. Supt., W.J. Blad, G-E Service Engineer, and Mr. Pearce. Project Co-ordination greatly simplified scheduling of numerous components.

# ahead of growing power requirements

## Project co-ordination by G.E. on 80,000-kw addition to Florida Power and Light's Cutler Station proves planning, teamwork pay-off

Cutler Station of Florida Power and Light, located near Miami, is an outstanding example of the utility industry's bold answer to the problem of sky-rocketing load growth in many areas. General Electric worked with F.P. & L. and its consulting engineers, Ebasco Services, Inc.—co-ordinating application engineering, product specifications, manufacturing and design cycles and scheduling of electrical equipment deliveries to help make sure the station went on the line on time.

In the expansion of this outdoor station, as in many stations throughout the country, Project Co-ordination has demonstrated its contributions to the planning, engineering, and successful operation of electric utility generating plants.

Such project co-ordination, combining the utility, the consultant and G.E.'s team of sales engineer, product specialists, application engineers and field service engineers, can save you time, money and man-hours. **Here's how:**

**SIMPLIFY ORDERING OF EQUIPMENT**, purchased either directly, or through your consulting engineers, or through a machinery manufacturer.

**CONSERVE ENGINEERING TIME** by co-ordinating mechanical details which frees you and your consulting engineers for other urgent problems.

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**SPEED CONSTRUCTION** by scheduling the arrival of equipment for maximum installation efficiency.

**SUPERVISE INSTALLATION AND HELP TRAIN OPERATORS** to insure minimum start-up time and better understanding of the full operating capabilities of the equipment.

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HELPING the **MAN-IN-THE-PLANT**

## *Ideas.. Methods.. Gadgets*

### **More Compressed Air Capacity at Low Cost**

**C**OMPRESSED air capacity a problem? It was at a Texas Chemical Plant. Compressed air supply was usually unable to keep up with air demands. This was especially true during the day shift on week days when the already sizable demand for process purposes would be swelled by additional demands for daytime maintenance equipment.

Several portable air compressors were in use throughout the plant to supplement normal supply at points of intermittent large usage. However, even a reasonable number of portable compressors could not supply all the points of demand. Frequently suf-

ferring from lack of air were the structural shops and the tubular heat exchange maintenance shop.

Since the distribution and supplying of compressed air for the miscellaneous plant usage was the responsibility of the Utilities Area, the Utilities Area Supervisor was vitally concerned with this problem.

#### **Unit Modified**

On his suggestion a survey was made to determine the effectiveness of the portable gasoline engine driven compressors. This survey revealed that one of the first compressors installed in the plant was giving only limited service,

due to major repairs required by the gasoline engine and cooling system.

However, the compressor itself was still in reasonably good condition and with only minor repairs could be restored to full capacity if an adequate drive could be provided. At this point, several convenient circumstances presented themselves which led to a very satisfactory solution to a portion of this air shortage.

This compressor was removed from the portable unit and mounted on a permanent structure. An electrical motor of the proper size was found in the warehouse. This motor was being maintained as a spare for the fan drive motors on the cooling towers.

The motor was mounted on the same frame as the compressor unit and connected to the compressor by V-belts and pulleys of the proper ratio.

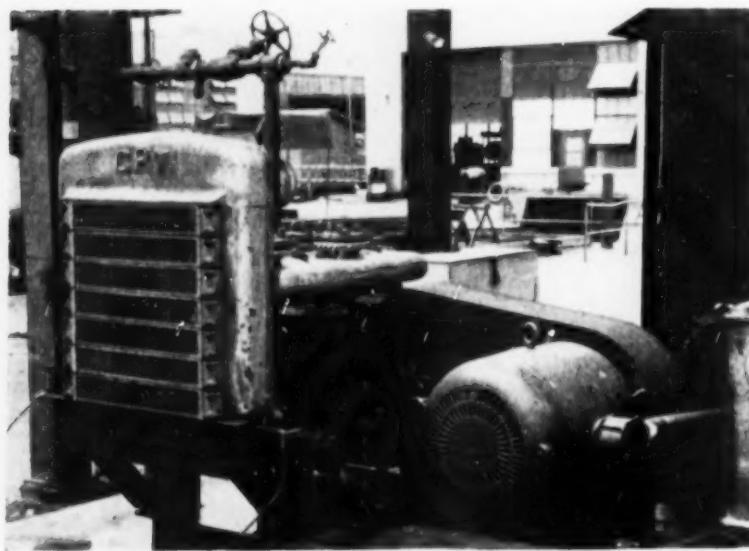
The motor is still available as a spare for the cooling towers if needed since it could be disconnected and moved in about an hour's time.

This unit was then mounted on a concrete pad adjacent to the maintenance shop area.

Discharge piping from the compressor is so connected that the air is supplied to the shop area and any excess over the demand of this area is relieved into the main plant air header system.

Since during the night adequate air is usually available, this compressor is normally operated only during the day. However, during the period of operation it has been delivering full capacity continuously. This added capacity was obtained with a minimum of expenditure since all materials ex-

**AT MINIMUM initial cost, this reclaimed portable compressor helped fill compressed air needs.**



cept the pulleys and V-belts were available in the plant and adequate power generating capacity was available to handle this additional load.

#### Production Advantages

This installation increased the air supply, thereby maintaining full required pressure on the air header in the maintenance shops. This in turn assured maximum efficiency and productivity of the use of air powered tools and equipment.

The new set-up resulted in simplicity of operation, reliability of operation, flexibility, reduced maintenance costs, and reduced operating costs—all this with a minimum initial cost.

By J. E. PARKER, Department Head, Utilities Engineering Division, Carbide and Carbon Chemicals Company, Texas City, Texas

#### Grit Blast Lighting

THE use of  $\frac{1}{2}$ " thick plate glass to protect lamp bulbs in grit blast operations has proven to be impractical and costly. The glass soon clouded over, wore through and had to be replaced. Invariably the lamp had to be replaced as well.

Substituting  $\frac{1}{4}$ " plexiglass eliminated all phases of trouble in that there was little or no clouding and consequently no wear or lamp breakage due to flying grit particles.

By A. F. SCHLÖTTERER, Electrical Engineer, General Electric Company Power Transformer Plant, Rome, Georgia

#### \$\$\$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

**Southern Power & Industry**  
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Atlanta 5, Georgia

# NOT A WEAK LINK

## IN THE CONSTRUCTION OF

# "BUFFALO" INDUCED DRAFT FANS



So much depends on the continued operation of your draft fans that it pays to be sure that there are no weak links in the construction. Housings, wheels, blades, bearings and shafts—all must be up to the job, or the fan as a whole cannot function.

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It is all part of the "Q" Factor® which assures you of best results whenever you buy "Buffalo". Write now for Engineering Bulletin 3750.

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Sales Representatives in all Principal Cities

## Ideas & Methods (Continued)

### Power Factor Correction

In a Texas metal plant we had a problem of overloaded transformers and low voltage at our motors. What to do?

We could have purchased larger transformers or another bank to handle our overload. Larger feeders would have helped the voltage at the motors but would not help the transformers. None of those ideas were appealing on account of the cost involved, the time to get additional transformers and the time that would be required to increase the feeders.

So we decided to investigate what could be done in a less expensive and quicker way.

Our substation is served by a power company at 4160 volts, three phase, 60 cycle. Our power transformers are 250 kva, 2400 to 480 volts, single phase. The primary connections are Y and the secondary connections are delta.

We have no synchronous motors to use for bettering our power factor, so could not look in that direction for improvement. The transformers were connected on the lowest taps and the power company was delivering the full 4160 volts. Even if we could have increased the motor voltage we would have lowered the overall power factor because the inductive currents in the motors would have been more, thus putting a greater kva load on the transformers and we would have had a greater line loss to the motors.

We installed two current and two potential transformers in the circuit to the power transformers and connected their secondaries to two single phase wattmeters, one ammeter and one voltmeter. We first checked ampere and volt balances

by reconnecting the ammeter and voltmeter, and found well balanced conditions.

Our load is a very constant one during hours of plant operation but we took a number of readings during the day with the following results all in terms of the primary values:

Amp.	110
Volts	4200
Kw.	448 and 112 on the two wattmeters, a total of 560.

We next computed the power factor as follows:

$$\frac{110 \text{ amperes} \times 4200 \text{ volts} \times 1.732}{1000}$$

equals 800 kva.

The power factor was then  $\frac{560}{800}$  or .70

The load of 800 kva was an overload on the transformers and we wanted to add an additional load of 80 kw which we figured would be about the same power factor as our original load. That meant the load on the transformers would be 640 kw at .7 power factor or 640 divided by .7 equals 915 kva with a transformer rating of 750.

The power factor of .7 is the cosine of the angle between the voltage and current or about 46 degrees. The sine of that same angle is the reactive kva or kvar. A trigonometric table showed the sine of 46 degrees to be .72. Then  $.72 \times 915$  or 660 kvar, would be the load in reactive kva.

We then consulted various capacitor manufacturers' catalogs and found General Electric, Westinghouse and Cornell-Dubilier all made 4160 volt, three phase capacitors in 45, 90, 135 and 180 kvar sizes.

The tangent of the angle between the current and the voltage is the ratio of  $\frac{r \text{ kva}}{kw}$ .

The power factor is the cosine of that same angle. We then made the illustrated table.

1. Kw.	2. Capacitor Kvar	3. Trans. Bank Kvar	4. Tangent of Angle Col. 3 $\div$ 1	5. Angle Degrees	6. Cosine of Angle Power Factor	7. Trans. Bank Kva Col. 1 $\times$ 1
		660 Col. 2				
640	0	660	1.035	46	.7	915
640	180	480	.75	37	.8	800
640	225	435	.68	34	.829	775
640	270	390	.61	31	.857	750
640	315	345	.54	28	.883	615

Thus with a bank of 315 kvar in capacitors, the kva load on the transformer bank would be brought down to 615 which we considered allowed sufficient margin with the 750 kva transformer rating.

The capacitors were purchased and installed and the power factor and kva came to the calculated figures. The voltage increased about 8 volts on the 480 volt side of the transformers while the plant was operating. In off-peak periods the voltage increase was about 12 volts which was not too high for the equipment then on the line.

We were well pleased with the results obtained, the lower cost involved, the time saved and the voltage improvement.

By VICTOR N. FRIEDMAN, Electrical Engineer, National Lead Company, St. Louis, Mo.

### Efficient Firing

SOME time ago an Iron Fireman gas burner (model GCV-4-6) was installed in the boiler room of the Florence, Alabama, Coca-Cola Bottling Company to replace existing coal-fired equipment. According to Walter S. Bell, bottling company manager, one of the major advantages of the burner is that it is no longer necessary to fire the boiler in the early morning.

"The efficiency of the gas-fired Iron Fireman unit is very good," Bell declared. "It is quite clean, and has afforded us easier operation."

The Iron Fireman burner used in the plant operates with so low a draft that draft controls are not required, owing to the large percentage of primary air entrained through the proportional mixing Venturi tube. When the gas supply is cut off, the flow of air through the fire box naturally reduces.

The model is manufactured with four rows of burner heads, six heads deep, with over-all measurements of 24" x 24". The various sections of the burner heads may be operated independently, in proportion to the amount of heat required. Consequently, the burner is both step-acting and modulating.

# Which type of steam trap is best for your need?

*With these 5 different types to offer, Sarco can give you impartial advice*

**A**ny type of steam trap will do "some kind" of a steam trapping job for you.

But there's a world of difference in trapping efficiency when exactly the *right* type of trap is used for a given application.

That's because both trapping conditions and the characteristics of different types of traps vary widely. There simply isn't any *one* type of trap that will do an efficient job under *all* circumstances. But there is always a particular type of trap best suited for each *specific* set of conditions.

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- 1 **Sarco Balanced Pressure Thermostatic**  
Greatest capacity per dollar cost. Large air venting capacity. Same head and seat, 0-300 psi. Freeze-proof. Cat. 250-A
- 2 **Sarco Float-Thermostatic**  
Discharges condensate continuously at steam temperature and without shock. Responds immediately to varying loads and pressures. Cat. 450-A
- 3 **Sarco Camlift Bucket**  
New, powerful Camlift valve mechanism permits greater discharge with no increase in size of trap body. Cat. 360-A
- 4 **Sarco Liquid Expansion**  
Adjustable to discharge condensate below 212°F. Freeze-proof. Not affected by water-hammer or pressure pulsations. Cat. 260-A
- 5 **Sarco Thermodynamic**  
Valve head, a solid stn. st. disc, is only moving part. Same head and seat to 600 psi. Not affected by superheat, water-hammer, corrosive condensate. Cat. 255-A

*ent* types of traps. In a nutshell, it's to assure you of best trapping results at all times, regardless of requirements.

And don't overlook the very important fact that *only* Sarco makes all these 5 types — not merely variations of one type. Therefore, Sarco can give you absolutely impartial trapping recommendations, backed by 43 years of field experience. Call your local Sarco representative or write:

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2083-C

**ONLY SARCO** makes all 5 types of traps

*—not merely variations of one type!*

SARCO SAVES STEAM

## Liquid Level Indicator For Hazardous Service

LIQUID anhydrous ammonia has a vapor pressure of 114 psi gauge at 70 F. Boiling and vaporization occur if the temperature increases or the pressure decreases. Ammonia fumes are toxic if permitted to escape.

The Tennessee Coal and Iron Division of United States Steel uses two 9 x 43 ft tanks of anhydrous ammonia at its Fairfield, Alabama, mill. It is necessary to take liquid level readings of these tanks for rate of consumption and for inventory purposes. The boiling effect of the liquid creates a turbulence which makes direct reading difficult. The very low specific gravity of the liquid (0.61 at 70 F) and high gauge pressure (114 lb) presented a difficult indirect reading problem, since a ball-type or doughnut-type float large enough and light enough for buoyancy might collapse under the high pressure.

### Special Float Design

Fischer & Porter designed a liquid level indicating system which overcame both the lack of buoyancy of the liquid and float bouncing due to the turbulence of boiling. The principle of the F & P magnetic Cable & Drum liquid level indicator was combined with the ball-float type level indicator to produce a strong, light, wide surface float which would withstand tank pressure and prevent surging.

Five raft-type ball floats give sufficient displacement to float three powerful magnets while the small size of each ball gives adequate strength. This unit fits over a sealed extension well in which a follower magnet slides. Latter is attached by a cable to the indicating mechanism of the instrument. Float travels freely up and down on the outside of the well and the follower magnet on the inside of the well is hermetically sealed from the tank contents. The indi-



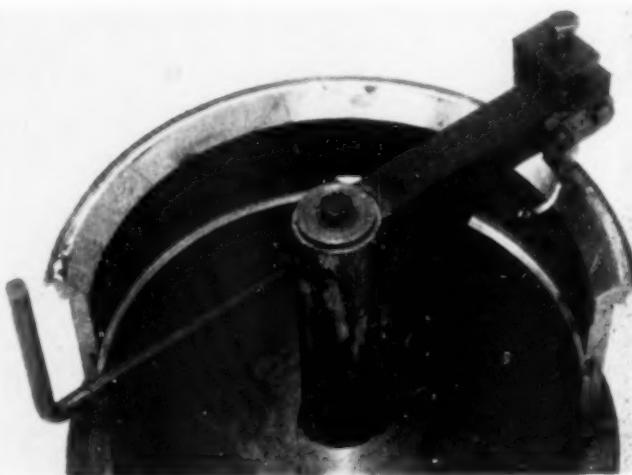
Fischer & Porter instrument gives direct reading in feet and inches for level variations as great as 37 ft.

cating mechanism is thus protected without the use of pressure tight bearings or cumbersome seals.

These continuous level indicators have been operating for about a year. Tennessee Coal and Iron engineers state that more accurate readings can now be taken more quickly than with standard gauge glass.

### Old vs. New Method

The conventional standard design gauges as previously used consisted of a series of vertical gauge glasses, each overlapping, on the end of the 43 ft tank. Each gauge glass was supplied with two shut-off valves, one on the top and one on the bottom. The valves were opened on the gauge glass where the level was estimated to be. The approximate level was difficult to read because of the boiling action. Usually it was necessary to place dry ice around the gauge glass to reduce the boiling sufficiently to obtain a fairly accurate liquid level reading. After taking a



### Bearing Facing Tool Reduces Fitting Time

IN ORDER to eliminate the tedious hand filing and scraping to adjust the thrust clearances on a particular industrial gas engine crank bearing, this bearing facing tool was designed.

The tool enables a mechanic to remove the required amount of babbitt from the bearing in less time than formerly required, and also results in a more uniform bearing surface than can be obtained by hand filing and scraping.

The tool is hand operated and is designed so that it can be made in any ordinary maintenance shop for any size bearing. This bearing illustrated is 10" in diameter.

B. J. WARREN, Maintenance Engineer, Carbide and Carbon Chemicals Company, Texas City, Texas

reading, it was necessary to get the ammonia out of the gauge glass to avoid excessive pressure that might result from temperature rise of the ammonia. The upper valve was then closed and the lower valve left open until the vapor pressure forced the liquid out of the gauge glass into the tank.

Safety devices were necessary in the lines leading from the main tank to the gauge glasses in the event of breakage. Excess flow ball check valves were installed in the lines so that if the flow reached a given point, the valves would close.

The cable and drum type liquid level instrument gives a continuous accurate indication of the liquid level. No additional safety devices are needed and the tank may be pressurized within the test pressure of the float. Accuracy is assured at all times since the large area of the raft-like float eliminates bouncing, and the displacement is sufficient to maintain buoyancy in the low specific gravity fluid even with its considerable weight.

The procedure for taking a liquid level reading has now been simplified to giving a quick glance at the indicator dial.

## Bearing Failure

THE heavy uni-directional load imposed on single-acting compressor crosshead bearings posed a constant bearing failure problem due primarily to lack of lubrication.

The constant load and small angular movement of the bearing prevented the proper lubrication of the bearing surfaces with resulting wear.

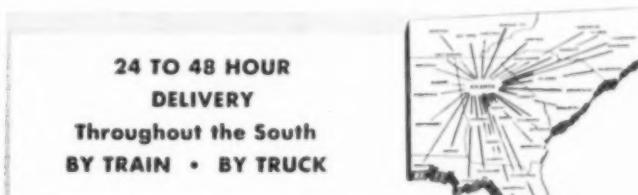
The original bronze bearings were replaced with roller bearings with practically no change in the crosshead and connecting rod. The roller bearings proved suitable for this service and in some cases increased bearing life a hundredfold.

BY N. T. ACOSTA, Foreman, Maintenance Department, Carbide and Carbon Chemicals Company, Texas City, Texas



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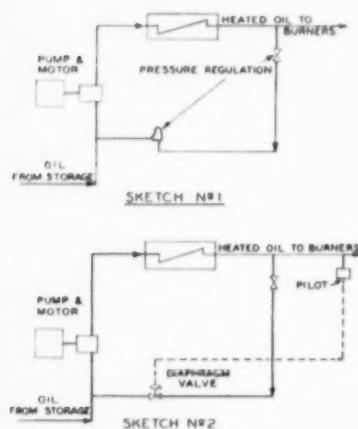
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## Ideas & Methods (Continued)

### Fuel Oil Burning System Improved

OUR Bunker "C" fuel oil burning system was installed as shown schematically in Sketch 1. Burner pressure was controlled by the relief valve and the manually operated gate valve. Pressure regulation by this means was not satisfactory.



To secure automatic pressure regulation and to permit the operator to change the automatic set point, a Fisher Governor Company Wizard Pilot Control and Diaphragm were installed as shown in Sketch 2. Pressure control is now very satisfactory.

By L. G. NELSON, Analysis Engineer, Gulf Power Company, Pensacola, Florida

### \$\$\$ For Your Ideas

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

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Atlanta 5, Georgia

### Electric Sanders

### Clean Building

CLEANING the faces of stone buildings is no easy task, especially when the surface is Texas limestone that has not been cleaned in 17 years!

Recently the Hall of State Building at Fair Park, Dallas, Texas, was scheduled for cleaning and it was decided that portable electric sanders would be used instead of sand blasting. Fungus, dirt and weather has discolored the Texas limestone building from its original gleaming white to a streaked muddy gray. A thick accumulation of foreign material had penetrated the porous limestone, and every inch of the 40,000 sq ft building had to be sanded or ground off to a depth of 1/32" to 1/16" to remove the ingrained oxides, fungus and dirt.

Five Black & Decker 7" Heavy-Duty Sanders were assigned to do the cleaning job. Experimenting with different types of abrasive discs showed a 16 open coat abrasive disc was best for the job. Two crews of two men each were equipped with the portable electric sanders and began bringing a new face to the limestone building.



CLEANING 40,000 sq ft limestone building in Texas with portable electric sanders.

In spite of the fact that Texas limestone is more difficult to clean than the hardest granite, the sanders did the job efficiently. After five weeks' time none of the units had to be overhauled, nor did any accumulation of dirt, grit and abrasive penetrate the sanders enough to make them inoperative, since the bearings and gear of the Black & Decker 7" Heavy-Duty Sanders are completely sealed. Filters were worn by the workers as protection against the limestone powder produced during the cleaning job.

### Calibrated Measuring Wheel

OPERATED by one man, the Rolatape—a calibrated measuring wheel—is proving high speed accurate lineal measurements for several types of industries.

Douglas Aircraft Co., in Tulsa, Oklahoma, reports: "The maintenance section has Rolatapes at the present time. The use of this device in locating roof leaks, valve boxes, etc., has permitted employing one man in lieu of the ordinary crew of two men. This has resulted in reduced operating costs."

The Rolatape used by Douglas is the Model No. 200 which registers up to 100 ft, then repeats the



cycle. Total distance is recorded in feet and inches on counter and recessed scale on wheel circumference.

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Note the wide range of subject matter:



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or Nature of Business \_\_\_\_\_

## News for the South and Southwest (continued)

Starts page 8

### Paul B. Holmes Represents Finnigan—D.C., Va., Md.

WILLIAM J. MCALPIN, President of the J. J. FINNIGAN COMPANY, announces the appointment of PAUL B. HOLMES as Sales Representative for the DISTRICT OF COLUMBIA, MARYLAND and NORTHERN VIRGINIA.

Mr. Holmes has been associated with the Plumbing & Heating Industry for nearly 37 years, starting in 1917 with the National Radiator Company's Washington Branch. He served as Assistant Director in charge of plumbing and heating of the Building Materials Division, National Production Administration during the Korean War 1951 to 1952.

The J. J. Finnigan Company, one of the South's oldest fabricators of boiler plate will have offices at 3714 14th St., N. W., Washington, D. C.



Paul B. Holmes

Other branches are located at Little Rock, Ark., New York City, Jacksonville, Fla., Houston, Texas, Dallas, Texas, and Charlotte, N. C. The main office and plant is located at 722 Marietta St., N. W. Atlanta, Georgia.

### International Nickel Expands Huntington Works

A new cold draw section, which extends length limitations on rods and tubes and triples capacity for producing heat exchanger tubes, is

now in operation at the Huntington Works of THE INTERNATIONAL NICKEL COMPANY, INC., HUNTINGTON, W. VA.

The unit comprises a building extension 350 feet long by 108 feet wide, a draw bench capable of drawing some tubes and rods up to 85

### B-I-F Industries—Texas

B-I-F INDUSTRIES, INC., Providence, R. I., has announced the formation of a new Texas division with sales and service offices in HOUSTON and DALLAS, TEXAS. B-I-F TEXAS, INC., represents Builders-Providence, Inc., Omega Machine Co., and Proportioners, Inc., manufacturers of meters, feeders and controls for water and sewage works and the petroleum and process industries.

The main office in Houston is staffed by JOHN B. MACKENZIE, JR., a vice president of B-I-F Texas, Inc., CHARLES J. WOLFER, RAYMOND W. McINDOE, JR., and MRS. LOLIE R. LOWE. The Dallas office includes EDWARD MOREY, JR., also a vice president of B-I-F Texas, Inc., LEWIS H. JOHNSON, JR., and MRS. FLOY BRAZELL, all former members of the firm, Morey and Morey, who for some 33 years represented B-I-F Industries, Inc., in the Southwest, RICHARD L. LAUDERDALE and CLEM D. HOYE, JR., who is the factory-trained serviceman for B-I-F Texas, Inc.

feet, and a gas-fired annealing furnace 220 feet in overall length.

A feature of the new draw bench is a magazine loading device which consists of a revolving cylinder in which six mandrels in sets of three each are placed one above the other.

Overall view of Inco's new cold draw operation. In the background is the annealing furnace. Draw bench, capable of drawing some tubes and rods up to 85 feet, is in center of building.



While the tubing is being drawn from the lower part of the cylinder, the upper three can be loaded in preparation for the next draw.

The furnace and its attendant equipment such as the charging table, cooling chamber, and discharging table, form a unit which is 300 feet from end to end. Designed for continuous temperature-controlled annealing of nickel, Monel and Inconel rods and tubes, it is the largest furnace of its type in the plant. It is equipped with 300 chain-driven rollers on which the material processed will move. Rollers inside the furnace are constructed of Inconel to withstand 2000 F heat without use of any cooling agents, such as air, which are ordinarily used to reduce the heat of furnace rolls.

To keep up with the furnace's large output and maintain a proportionately high level of production efficiency, the new addition will house a considerable amount of supporting equipment. The new tube-testing bench, which is 85 feet in length to accommodate the longest material, is the largest ever built by its manufacturer, the Taylor-Wilson Company, McKees Rocks, Pa.

The new \$1,250,000 cold draw operation is the second expansion of a major facility at International Nickel's Huntington Works during 1954. The first was a \$1,700,000 distribution center which was put in service April 1.

#### Robinson Represents Dravo—Texas, La.

THE D. M. ROBINSON COMPANY, 2436 South Boulevard, Houston 6, TEXAS, manufacturers' representative, has been appointed exclusive distributor of DRAGO Heaters and Industrial Air Conditioners for 39 counties in Southeast Texas and the parishes of Allen, Beauregard, Calcasieu, Cameron and Jefferson Davis in the State of Louisiana.

Robinson will sell and service Dravo's complete line of oil and gas fired units. These include the "Counterflo," "Paraflow" and Gas Fired suspended type heater models, covering a range of capacities from 68,000 to 2,000,000 Btu per hour output.

The D. M. Robinson Company also represents a notable group of manufacturers serving the commercial and industrial markets throughout this area. A service department, which is on call 24 hours a day, will be maintained.

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## News for the South and Southwest (continued)

### Worthington Names Maddock Works Mgr. at Decatur, Ala.

EDWARD R. MADDOCK has been appointed Works Manager of WORTHINGTON CORPORATION'S DECATUR, ALABAMA WORKS.

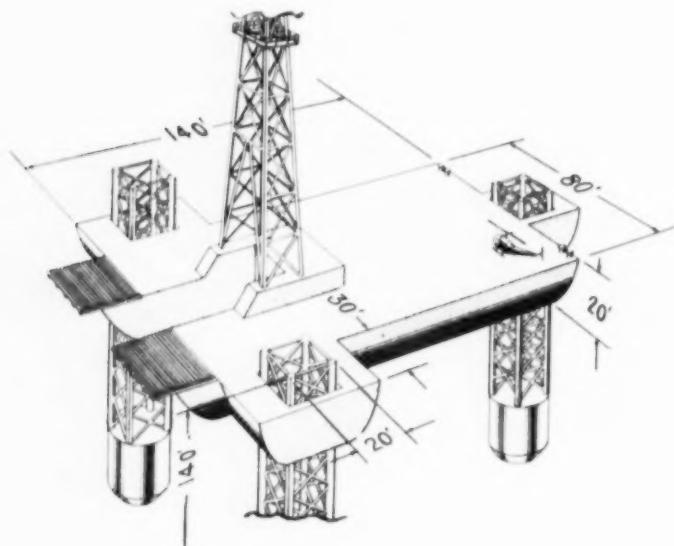
The company's Decatur plant, which started operations this year, is the first major air conditioning manufacturing plant in the South. Worthington is also a heavy producer of power plant equipment, construc-

tion, industrial, pumping, and mechanical power transmission equipment, in their various domestic plants.

Mr. Maddock is an alumnus of Worcester (Mass.) Polytechnic Institute where he obtained a B.S. degree in Electrical Engineering in 1935. Before joining Worthington as a test engineer in 1936, he was associated a year with New York Power & Light Co. Mr. Maddock has advanced successively in the Worthing-

ton organization, having been appointed Manager of Research and Development in 1948; and in 1952 he was made Manager of Maintenance. In 1953 he became Product Manager of Condensers, Heaters and Ejectors.

Mr. Maddock succeeds George P. Passmore, who resumes his duties as Assistant to the Vice President in charge of Manufacturing after his temporary assignment at Decatur Works. The Works was established under the management of B. R. McBath who was appointed General European Manager last March.



### Zapata Takes Option on LeTourneau Platform

R. G. LETOURNEAU, INC., of LONGVIEW, TEXAS, has announced that ZAPATA PETROLEUM CORPORATION has taken an option to purchase a LeTourneau Mobile Off-Shore Drilling Platform.

Construction work on the huge three-legged, ocean-going drilling platform will begin immediately at LeTourneau's VICKSBURG, MISSISSIPPI, plant and is scheduled for completion in early 1955.

When construction has been finished and testing operations completed, the drilling platform will be floated down the Mississippi River to the Gulf of Mexico. There it will be used for tidelands drilling with the platform elevated up to a height of more than 100 feet above the ocean floor. The platform is of all-welded steel construction and features electro-

mechanically controlled legs, called spuds, which are raised or lowered through openings located at three outboard points around the platform.

When the platform is to be floated to a new drilling site, these spuds project above the barge-like platform. When the site is reached, powerful electric motors push the spuds down through the wells into the ocean bottom. As the spuds reach the ocean floor, the motors elevate the platform up above the waves to a desired height.

The spuds can be operated in either direction—to permit the platform to be kept level.

The self-contained unit utilizes barge compartments to house equipment and for storage of drilling mud, water, fuel and other supplies. A slot at one end of the barge is provided for moving off the completed well.

The price of the unit is reported to be approximately two million dollars.

### VEPCO Promotions

MILES CARY, formerly manager of system operation, has been appointed operating manager of the VIRGINIA ELECTRIC AND POWER COMPANY.

The company has also made the following organizational changes in its system operating department: R. M. HUTCHESON, system manager—production; J. A. RAWLS, system manager—transmission and distribution; T. E. CROSSAN, system superintendent—production; JOHN McGURN, system superintendent—power supply, and T. S. MARTIN, system superintendent—transmission.

Miles Cary attended Virginia Military Institute and the Massachusetts Institute of Technology where he received his Bachelor of Science degree in mechanical engineering. He joined Veepco in 1926. In his new capacity as operating manager of the company, Mr. Cary will have general supervision of all electric and gas operations throughout the company.

R. M. Hutcheson is a graduate of Virginia Polytechnic Institute and has been with Veepco since 1927. As system manager—production, he will supervise all power generation and power supply operations.

J. A. Rawls attended Virginia Polytechnic Institute, receiving his degree in electrical engineering in 1926. His first work with Veepco was in Suffolk that year. Since 1947, he has been supervisor of electrical equipment and transmission. As system manager—transmission and distribution, he will have general supervision over all transmission and distribution operations.

T. E. Crossan began his utility career as a student engineer with the Tampa Electric Company in 1914. Through the years he has held top engineering positions with a number of utilities. He came to Veepco from

the Gulf States Utilities Company in 1946, where he was superintendent of production. As system superintendent—production, he will supervise the operation of all power stations.

J. M. McGurn is a native of Texas and attended the University of New Mexico. Following his graduation, he was employed by the El Paso Electric Company in 1934. He came to Vepco in 1941. As system superintendent—power supply, he will supervise the coordination of generation, purchase and interchange of power, and the loading and switching of the transmission system to obtain maximum efficiency and reliability of power supply.

T. S. Martin, Jr., studied electrical engineering at the University of Virginia and began his utility work with the Florida Power and Light Company in 1925. He joined the Virginia Public Service Company in Charlottesville in 1928. As system superintendent—transmission, he will have supervision over the transmission system, relay and control work, communication systems, substations and electrical apparatus.

#### Duke Power New Steam Plant

DUKE POWER COMPANY will invest over \$24,000,000 in a new steam-electric generating station on the Catawba River near BELMONT, N. C.

Construction of the first 165,000 kilowatt unit is scheduled to begin next Spring with an anticipated completion date of June, 1957. The installation will eventually be Duke's largest generating center, with a continuous capability of one million kilowatts.

The plant will be named for G. G. Allen, former president of the company and now chairman of its Board of Directors.

Plant Allen's site is about three miles from Belmont in the South Point area of Gaston County. Condensing water for the generating unit will be drawn from the Catawba and discharged into the South Fork River through a mile-long tunnel, which is part of the project.

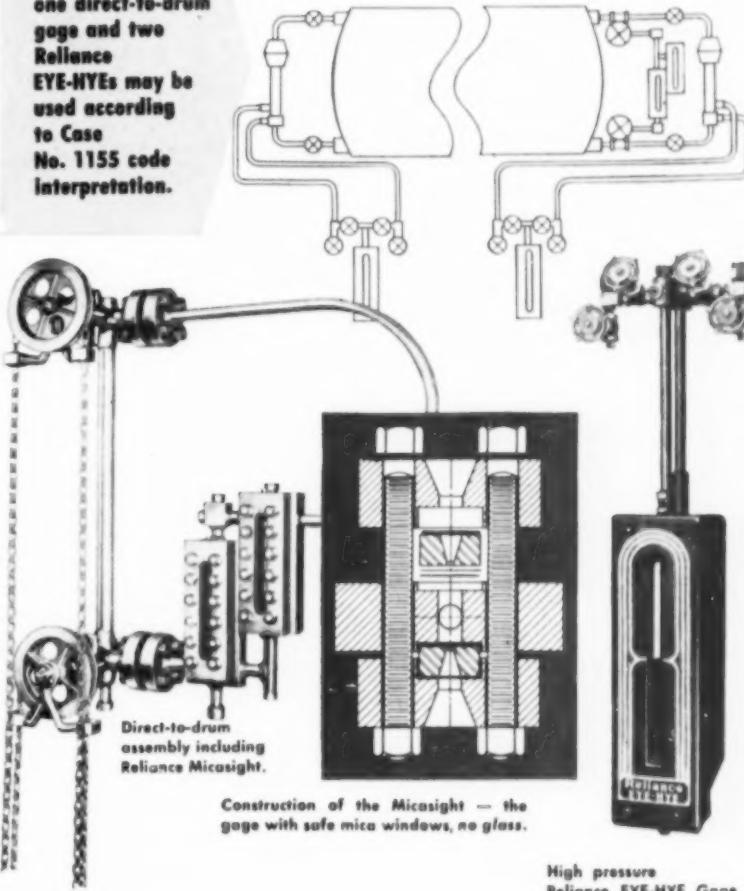
The new plant will be about 15 miles downstream from the River Bend plant.

Plant Allen's first unit will operate with steam pressure in the 2,000 lb class and 1,050 degrees F with reheat to 1,000 degrees F. The 3,600 rpm generator will produce electricity at 18,000 volts.

## More Convenience—More Safety in reading boiler water levels

This diagram illustrates how one direct-to-drum gage and two Reliance EYE-HYE's may be used according to Case No. 1155 code interpretation.

Permissible hook-up for high pressure boilers (900 lbs. and over) gives you double remote gage facility



It pays you to be familiar with provisions of the reply given in Case 1155 (boiler code) leading to more efficient gage reading on boilers operating at 900 psi and over. The two required manometric gages can be the remote reading EYE-HYE that supplies convenient eye-height supervision at your panel board. A gage glass must still be available at the drum, but it may be shut off when both remote gages are operating.

For the gage at the boiler, the safest known is the Micasight. Made up of tough sheets of mica clamped in a short, wide-bar non-breathing body, it gives you extra safety and long window life.

Direct-to-drum high pressure gages are made to fit individual needs, with expansion type tube assembly as illustrated above. Write for complete explanation of Case 1155.

The Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland 3, Ohio

**Reliance®**  
BOILER SAFETY DEVICES

## News for the South and Southwest (continued)



James M. Molpus, Ben W. LeTourneau, and Harry S. Clark

### R. G. LeTourneau—Texas

Major changes in management assignments at R. G. LeTOURNEAU, INC., have been announced effective September 1 by RICHARD H. LeTOURNEAU, Vice-President in Charge of Production. The changes coincide with the formation of a new Steel Products Division of the Company at LONGVIEW, TEXAS.

JAMES M. MOLPUS transfers to Longview from Vicksburg, Miss., to become General Manager of the Texas Division of R. G. LeTourneau, Inc., and BEN W. LeTOURNEAU, youngest son of Mr. and Mrs. R. G. LeTourneau, goes to Vicksburg to take over Mr. Molpus' former assignment as General Manager of the Mississippi Division.

HARRY S. CLARK, who has been Texas Division General Manager, has been named General Manager of the newly created Steel Products Division. This new division incorporates all of the LeTourneau Steel Mill operations at Longview and will expand production of steel plate, plate shapes and fabricated structures. The division operates as a separate facility instead of as a subordinate phase of main plant production.

### Yardley Plastics—Atlanta

YARDLEY PLASTICS Co., Columbus, Ohio, announces new warehousing service at 565 Western Ave. N.W., ATLANTA, GA.

"This new facility will enable us to give overnight and pickup service to our dealers and distributors in the Southern States," said ROBERT W. ROSEL, Sales Manager.

Yardley is one of the foremost manufacturers of plastic pipe.

### McDaniel Mgr. Westinghouse Technical Information

H. C. McDaniel has been appointed manager of technical information for the WESTINGHOUSE ELECTRIC CORPORATION.

Mr. McDaniel, formerly manager of technical publicity, will supervise both the technical publicity operations and the Westinghouse Engineer magazine. He replaces C. A. Scarrott, former technical information manager and editor of the Engineer, who has resigned to accept the position of manager of technical information services at the Stanford Research Institute, Palo Alto, Calif.

### W. R. Glidden Heads ASCE

The AMERICAN SOCIETY OF CIVIL ENGINEERS has announced the election of WILLIAM ROY GLIDDEN, of RICHMOND, VIRGINIA, as President. Mr. Glidden is Assistant Chief Engineer of the Virginia State Department of Highways. He succeeds DANIEL V. TERRELL, of Lexington, Dean of Engineering at the University of Kentucky.

### Organization Changes at Standard-Coosa-Thatcher

THE STANDARD - COOSA - THATCHER COMPANY, CHATTANOOGA, TENN., manufacturers of mercerized cotton yarns and industrial sewing threads, has announced that JOHN P. HARRISON, who has been agent and superintendent of the Coosa Plant, is being promoted to the position of vice president in charge of manufacturing for all plants. C. B. BENNETT will con-

tinue in his present capacity of assistant treasurer and manager of the Roving Yarn Division, and in addition he will be the local legal agent for the company. The operation of the local plant will be under the supervision of R. E. HAMRICK, who now becomes superintendent. Mr. Hamrick will have for his assistant, J. T. FORMBY, who has been made assistant superintendent.

A graduate of Georgia Tech with a B.S. degree in Textile Engineering, Mr. Harrison is well known throughout the Southern textile industry. He has held the positions of superintendent of Muscogee Manufacturing Company at Columbus, Georgia; general superintendent of Dundee Mills at Griffin, Georgia; president of Harrison-Walker Mills at Shelby, North Carolina; and vice president and general manager of Commander Mills at Sand Springs, Oklahoma.

### Skelly Joins Wheland, Tenn.

LAWRENCE E. SKELLY has joined the staff of the WHELAND COMPANY, CHATTANOOGA, TENNESSEE, as engineering specialist. He was formerly chief engineer of Giffels & Vallet, Inc., in their Houston office.



Skelly has long been active in the design of plants and equipment for the chemical and manufacturing industries. His appointment augments the present services of Wheland in the design and manufacture of specialized equipment for these industries.

Wheland is also engaged in the production of rotary drilling equipment, sawmill equipment, grey iron castings and radar-controlled cannons.

#### Frick Co.—St. Louis

Announcement is made by FRICK COMPANY, Waynesboro, Pa., of the appointment of HUGO REICHENBACH as manager of its Branch Office in ST. LOUIS, Mo.

Mr. Reichenbach was graduated in Mechanical Engineering from Washington University in 1931. After taking the Frick Refrigeration Training Course, he served in the Engineering and Estimating Departments of the company before doing sales work at the Dallas Branch.

#### SASI Elects Today

DR. FRANK J. SODAY, vice president and director of research and development for THE CHEMSTRAND CORPORATION, Decatur, Alabama, was elected president of the SOUTHERN ASSOCIATION OF SCIENCE AND INDUSTRY, after having served as vice president at large and state vice president of SASI in Alabama and Arkansas.



Before joining Chemstrand in 1951, Dr. Soday was director of research and development for LION OIL COMPANY, El Dorado, Arkansas for four years. Prior to that he had directed research and development in resins and protective coatings for DEVOE & RAYNOLES CO., INC., Louisville, Kentucky.

Approximately 130 U. S. patents are held by Dr. Soday, principally in the field of petrochemicals. He is a member of the American Chemical Society, American Institute of Chemical Engineers, National Association of Manufacturers, American Petroleum Institute, and other leading engineering and scientific associations.

## For BOILER BLOW-OFF Safety



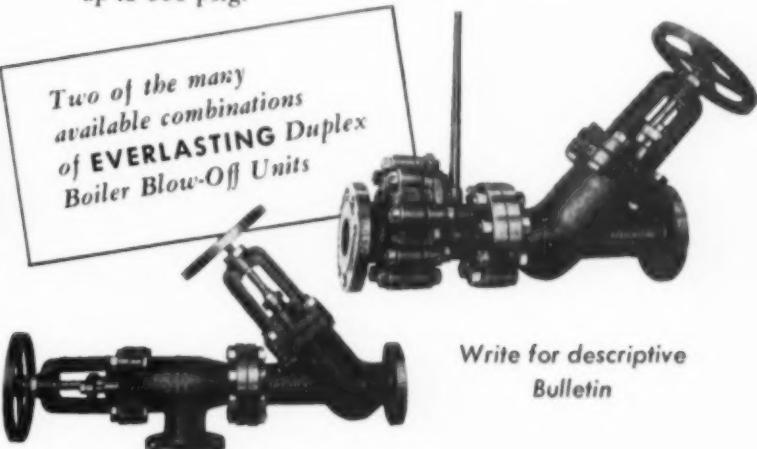
Standard  
Quick-Operating  
Everlasting Valve

Everlasting  
Y Valve

Everlasting  
Angle Valve

These Everlasting Valves are assuring safety in boiler plants all over the country. Each type is stoutly built, with ample strength, resistance to wear, and lasting tightness. Angle and Y designs have interchangeable parts for each size. The three types can be arranged in any combination as Duplex Boiler Blow-Off Units. All Everlasting Boiler Blow-Off Valves conform with ASME Codes, and are available in a range of sizes for pressures up to 600 psig.

*Two of the many  
available combinations  
of EVERLASTING Duplex  
Boiler Blow-Off Units*



Write for descriptive  
Bulletin

EVERLASTING VALVE CO., 53 Fisk St., Jersey City 5, N. J.

# Everlasting Valves

TRADE MARK EVERLASTING REG. U. S. PAT. OFF.

EV382

for everlasting protection

## (Molybdenum Disulfide in Plant Lubrication)

Starts page 70

use a bonded or a rubbed on film during the original installation of the parts, followed at regular service intervals with oil lubrication. The bonded film would be preferred if the normal period between overhauls is extensive. However, the rubbed on film can be used if the overhaul period is rather frequent.

It would be misleading to give any life periods for the various Moly applied films since these depend upon the design of the parts and the severity of operations. Your own experience will suggest which method to follow. A point to keep well in mind is that **solid film lubricants will wear out in time**. They lack the flow proper-

ties of fluid lubricants and do not readily heal breaks in their films. Their **proper maintenance** should be an integral part of the regular shop or equipment lubrication schedule.

Molybdenum disulfide has been tested on diesel locomotive **cylinder liners and pistons** as an aid to better break-in of the assemblies. The high spots on the rubbing surfaces of new or reconditioned parts must wear in uniformly and gradually, and a solid film of Moly minimizes the danger of excessive seizure and tearing out of large wear particles. Moly can be considered as providing the additional film strength which the lubricating oil fails to provide

### Applications in The General Industrial Field

We emphasize again that it is not our intent to encourage the use of solid film lubrication, particularly molybdenum disulfide, unless there is a real need for it. Most lubrication requirements can be satisfied by well refined oils and greases. Solid film lubricants are unique in their own right, and when properly used can solve certain perplexing lubrication problems. We should endeavor to **USE THEM CORRECTLY and ONLY WHERE APPLICABLE**.

**AVOIDING CONTAMINATION** of bearings and/or materials. Bearings in the chemical industry may be subject to hot vapors or the washing action of liquid chemicals. In addition to dry lubrication staying put, the materials are not contaminated.

**In the instrument field**, dry films used on threaded connections or guides avoid the accumulation of injurious dirt and dust. Oils like likewise creep into undesirable locations, like contacts in electronic instruments.

**Textile mills** wish to avoid contamination in carding, spinning, and packaging operations. High speed bearings may tend not only to throw off or leak excessive oil and greases, but the collection of lint in the bearings will eventually lead to stoppage.

**Food processing industries** are intensely interested in clean lubrication and undoubtedly make use of solid lubricants. Two of the many possible applications are conveyor lines leading to and passing through can-filling machines; and exposed bearings on mixers, tumblers, etc.

**LUBRICATION OF AREAS** where oil and grease film are difficult to maintain. Examples include flat friction surfaces or reciprocating parts, and on the railroads, the passenger car truck pedestal liners (flat vertical wear plates) that rub against the sides of the journal boxes. In the machine tool industry, a prime coat of Moly, followed by regular fluid lubrication on the ways of boring mills, lathes or planers reduces the danger of seizing and galling during assembly and following wear-in period.

**HIGH TEMPERATURE LUBRICATION** Moly excels at preventing freezing of threaded connections subject to high temperatures. Rubbing dry powder into threads is sufficient, though pastes of Moly and SAE 10 or 20 oils have given good service.

under the severe pressures that localize at the juncture of minute ridges or high spots.

We have tried rubbing the dry powder onto the parts with a soft cloth, using enough pressure that a thin, polished film remains. Piston skirts, grooves, lands, and rings are also treated. The assemblies are then oiled and applied in the usual manner. We think the dry powder application just described is best for break-in protection and our mechanics report good success from it.

Other uses of Moly on the B&O RR include:

(1) **Diesel exhaust manifold studs and bolts**—Loss or ineffectiveness of lubricant, like oil or grease, at the high exhaust manifold temperatures causes the threaded connections to freeze so that many are broken in attempts to remove the manifold for engine repair.

Moly maintains a protective film at the high temperatures, thus eliminating welding of metal and making for easier removal of parts; when using Moly on stud and bolt threads, lower torque is required for tightening. Studs and bolts can be overstretched unless new torque values are established. It is suggested that tests be made to determine torque value against the required stretch.

(2) **Bronze expansion plates of bridges**—A flat steel shoe slides over a flat bronze plate; seizure has occurred using regular greases. The two conditions of flat sliding surfaces and intermittent operation make retention of oil or grease difficult. Both Moly and graphite have been found to work well.

(3) **Diesel switcher coupler wear plates**—To negotiate sharp curves a coupler extended is required to lengthen coupler and provide more room for turning. The additional leverage increases loading on supporting plates and freezing often occurs. Dry Moly powder rubbed frequently onto the plates has eliminated seizures and facilitated turning of coupler by trainmen during coupling to cars.

At the present time plans are underway to extend the use of

Examples in the **power industry** are boiler bolts and steam and gas turbine nuts and bolts. In the **hot forming of metals** like sheet magnesium and austenitic stainless steels, dry powder brushed onto the dies reduces seizure and metal pick-up. Die life can be prolonged in hot press forging operations. Bearings of trucks or conveyors that operate through kilns or furnaces, or any friction surfaces in ovens or dryers are other examples.

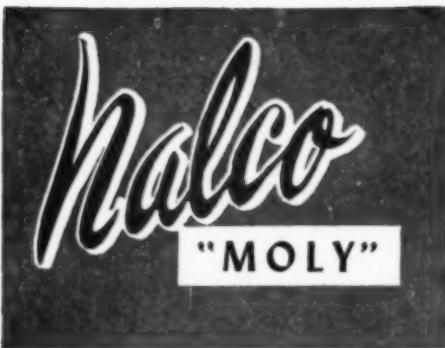
The **aircraft industry** requires lubrication of parts located in high temperature zones, such as jet engine afterburner shutters, turbine shaft hub nuts, and the ball bearings in the electro mechanical activators.

**HIGH PRESSURE LUBRICATION** Most industries can profit by giving their products a good start in service. Proper wear in of new assemblies prevents premature failures and means dollars saved in better overall performance and less maintenance expenses. Although lubrication is not the whole story to the general problem of wear-in, it plays a major part wherever scuffing or scoring is likely to occur.

Molybdenum disulfide's ability to reduce metal to metal contact at the high pressure areas of contact between new parts means controlled wearing down of high spots until the area sustaining the load has increased sufficiently to carry the load effectively. After satisfactory break-in, conventional lubrication with oils and/or greases is possible.

The use of Moly warrants consideration wherever repeated attempts with fluid lubricants have failed because of high pressures involved; should heat dissipation be critical and fluids required to help carry away the heat, incorporating Moly as an additive has been practiced, e.g. in the transmission and differential of heavy duty trucks.

The **metalworking industries** have possibilities for solid lubricants. Main purpose here is to prevent surface damage to both dies and worked parts because of metal seizure. Proper lubrication saves many hours of refinishing dies and often facilitates removal of the material from the die. Examples are cold drawing stainless steel or carbon steel wire and cold forming or heading operations. In press fitting, Moly can help by permitting lower load applications, reducing chatter and dangers of galling, and making press outs easier.



### for Applications where:

- High bearing pressures are encountered.
- Objectionable dirt, dust or other abrasives are entrapped by ordinary lubricants.
- Grease, oil or graphite lubricants create a contamination or house-keeping hazard.
- Extremes of moisture and temperature are encountered.
- Lubricant must have excellent chemical stability.

### STICK FORM Nalco "MOLY" LUBRICANT

• STICK Lubricant is molybdenum disulfide in a plastic carrier molded to a controlled degree of hardness. Used in simple holders to give continuous application on rotating surfaces, or for manual application.



### NATIONAL ALUMINATE CORPORATION

6226 W. 66th Place • Chicago 38, Ill.  
In Canada:  
Alchem Limited, Burlington, Ontario

# DRY LUBRICANT

(MOLYBDENUM DISULFIDE BASE)

NALCO "Moly" Lubricant makes use of molybdenum disulfide in a suitable carrier to form an efficient, long-lasting dry lubricating film on bearing surfaces. Where pressures are high, the molybdenum disulfide film becomes so firmly attached to metal surfaces that it is often difficult to remove without grinding or machining!

Temperatures from -40° F. to 500° F. do not affect Nalco "Moly"; nor does dampness or high humidity. It is non-injurious to even the softer metals, like brass and aluminum.

Write for more details on Nalco "Moly" Lubricant. Chances are good that it has some excellent application possibilities in your plant.

Typical application of Nalco "Moly" stick Lubricant to railroad locomotive wheel flanges. Abrasive-free lubrication of high pressure flange-rail bearing surfaces prolongs wheel and rail life.



Nalco®

**PRODUCTS . . . Serving Industry through Practical Applied Science**

molybdenum disulfide in the following applications:

(1) During the furnishing of railway axle journals to obtain smoother wearing surfaces impregnated with a coating of good anti-friction qualities. It is possible that a journal so treated will provide better wear-in of new solid journal bearings.

(2) Application to the backs of journal bearings and steel wedges in the freight car journal box assembly. Friction of wedge against the ceiling of the box and against the brass bearing back over which it slides restricts the free lateral movement of the car and creates uneven load distribution to the bearing. Reduction of friction will also mean less heat transferred to bearing surfaces.

(3) On the backs of main and connecting rod bearings to reduce fretting and subsequent corrosion.

(4) Passenger car truck load

carrying and roll stabilizer pins, side bearings, and journal box pedestal liners. These areas fail to retain enough oil for continuous lubrication. A solid film of Moly carries load when lubrication has run dry.

When considering molybdenum disulfide as a lubricant, it would be worthwhile to try several different formulations and then select the one found most suitable. You will find, as is so often the case with relatively new products, that your particular application has never been quite duplicated anywhere else. In a real way, you may find yourself pioneering a new application, and a lot will depend on your own resourcefulness.

There's no need to use Moly where lubrication with oils or greases has proved successful. You will find that, on a weight or volume basis, molybdenum disulfide is more expensive than con-

ventional lubricants. However, experience should demonstrate that the overall lubrication cost is not any greater, and often less, than when petroleum based lubricants are used. Actually, very little Moly is required for most lubrication jobs.

The important criterion, of course, is whether or not we are getting the lubrication we need.

#### REFERENCES

- 1-Ming Feng: Lubricating Properties of Molybdenum Disulfide. Lubrication Engineering, Vol. 8, No. 6, 285, 1952.
- 2-J. Boyd and B. P. Robertson: The Friction Properties of Various Lubricants at High Pressures. Trans. A.S.M.E., Vol. 67, No. 1, 51-66, Jan., 1945.
- 3-D. Godfrey and E. E. Bissom: Effectiveness of Molybdenum Disulfide as a Fretting-Corrosion Inhibitor. N.A.C.A. Technical Note 2180, Sept., 1950.

### Molybdenum Disulfide Lubricant Formulators

Climax Molybdenum Company of New York City produces and sells molybdenum disulfide in powder form under the trade name "Moly-Sulfide." The following is a partial list of companies which *SP&I* Editors believe are now offering lubricants containing Moly-Sulfide in one or more forms: either as a dry powder or compounded with oil, grease, synthetic lubricant, volatile vehicle, resin, or other carrier.

This tabulation is undoubtedly incomplete but is presented as a service to *SP&I* readers as a source for additional information on this phase of industrial and power plant lubrication.

Acheson Colloids Corp., Port Huron, Mich.—Dag Allube Corp., 928 Allen Ave., Glendale 1, Calif.—Allube M. Lubricants

The Alpha Corp., 179 Hamilton Ave., Greenwich, Conn.—Molykote and Moly-Spray Kote

Amber Lubricants Co., 1569 West 16th St., Long Beach 13, Calif.

The American Lubricants Co., 1227 Deeds Ave., Dayton, Ohio—Alubco Molyshield

The A. P. Parts Corp., Miracle Power Div., A. P. Bldg., Toledo 1, Ohio—Micro Moly and Micro-MolyGraf

Bel Ray Company, Green Village, Madison, New Jersey

Brewer & Elliot, Inc., 131 State St., Boston 9, Mass.—Bemal

Coast Paint & Chemical Co., 1507 Grande Vista Ave., Los Angeles 23, Calif.—Pro Seal Lubrifilm

Drilube Co., 723 West Broadway, Glendale 4 Calif.

Elco Chemical Co., 700 Delaware St., Berkeley, Calif.—Elco Lubricants

Electrofilm Corp., 7116 Laurel Canyon Blvd., North Hollywood, Calif.—Lubi-Bond, Lube-Tek, and Dri-Oil

Fiske Brothers Refining Co., 1500 Oakdale, Toledo, Ohio

Hohman Plating & Mfg. Co., 905 East Third St., Dayton, Ohio—Surf-Kote

Imperial Oil and Grease Co., Inc., 6399 Wilshire Blvd., Los Angeles 48, Calif.—Molub Alloy

Imperial Metallic Lubricants Co., 735 Spring St., Atlanta, Georgia—Molub Alloy

The Lockrey Co., Lubricants Div., Southampton, Long Island, N. Y.—Liqui-Moly

Mill Hall, Inc., Giant Road, Richmond, Calif.—Molykote

Milwaukee Gas Specialty Co., 730 North Jackson St., Box 461, Milwaukee 1, Wis.

Moly Lubrication Products, 305 East Shore Rd., Great Neck, Long Island, N. Y.

National Aluminate Corporation, 6216 West 66th Place, Chicago, Ill.—Nalco Flange Lubricator

Pacific Lubricants Co., 5807 East Beverly Blvd., Los Angeles 22, Calif.—Auto-Moly

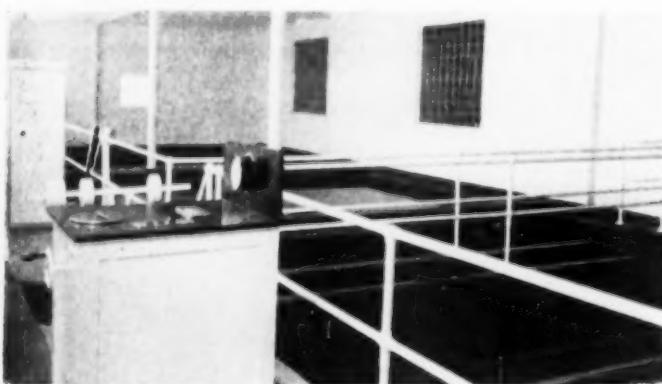
Panther Oil & Grease Mfg. Co., Fort Worth 1, Texas—Molyplate

W. S. Rockwell Co., 200 Elliot St., Fairfield, Conn.—Schaeffer Mfg. Co., 102 Barton St., St. Louis 4 Mo.

Union Supply Co., 1920 Market St., Denver, Colo.

United Petroleum Co., 4136 Eagle Rock Blvd., Los Angeles 65, Calif.—Moly Shield EP Film and Moly Shield Lubricants

Washington-Imperial Company, 1237 22nd St., Northwest, Washington 7, D. C.—Molub Alloy

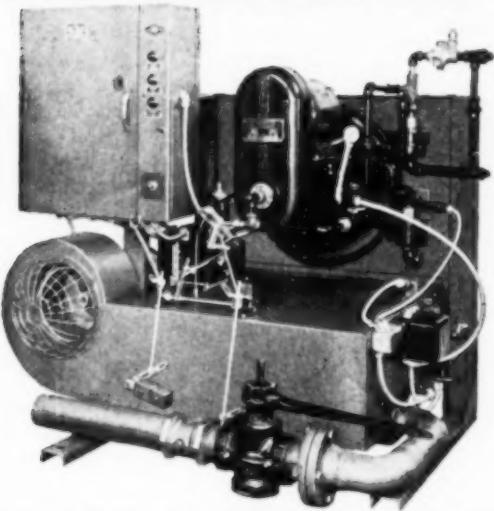


### Protective Coating for Filter Plant

A DIFFICULT painting problem faced plant engineers of Fieldcrest Mills, Inc., at Spray, North Carolina. The liquid level in the filters of the plant's 4,000,000 gpd filter plant fluctuates so that surfaces are alternately wet and dry. This made it very difficult to secure and maintain a satisfactory, attractive paint job. The situation was not helped by the liquid's pH of 5.5 to 6.5.

Torex Enamel, a chemical resistant coating in color manufactured by the Inertol Company, Inc., was tried. Torex is chlorinated natural rubber-base paint. Light Blue No. 301 was used in three coats for the first painting. Not only did it solve the problem, but its long life has cut down on maintenance painting. The tile-smooth finish of the Torex enamel discourages the growth of troublesome algae, and makes cleaning far easier and less frequent.

# WEBSTER ROTONETIC\*



## DUAL FUEL FIRING BURNER

- ✓ Sizes from 75 to 300 horsepower.
- ✓ Minimum gas pressure requirements.
- ✓ Low installation costs.
- ✓ Maximum efficiencies on BOTH gas and oil.
- ✓ Minimum base height requirements.
- ✓ Utilizes all grades of fuel oil.
- ✓ Extremely low noise level.
- ✓ Approved electronic combustion safe-guard system.
- ✓ Simpler changeover than ever before.
- ✓ One hundred per cent forced draft.
- ✓ Completely assembled, piped, wired and tested.

These and many other outstanding features combine to provide the same dependable high quality performance as the WEBSTER DYNAMIC gas burner. Neither fuel must suffer if the WEBSTER ROTONETIC is used. With integral pumps, integral oil preheaters for heavy oils, patented oil burner "flame-shaping" vanes, and full modulating or optional high-low control, the WEBSTER ROTONETIC is designed to provide long lasting customer satisfaction the year around.

It is furnished with a precast refractory front as an integral part of the burner assembly. The installer need only finish the furnace wall on each side and above the burner.

Listed by Underwriters' Laboratories, Inc.

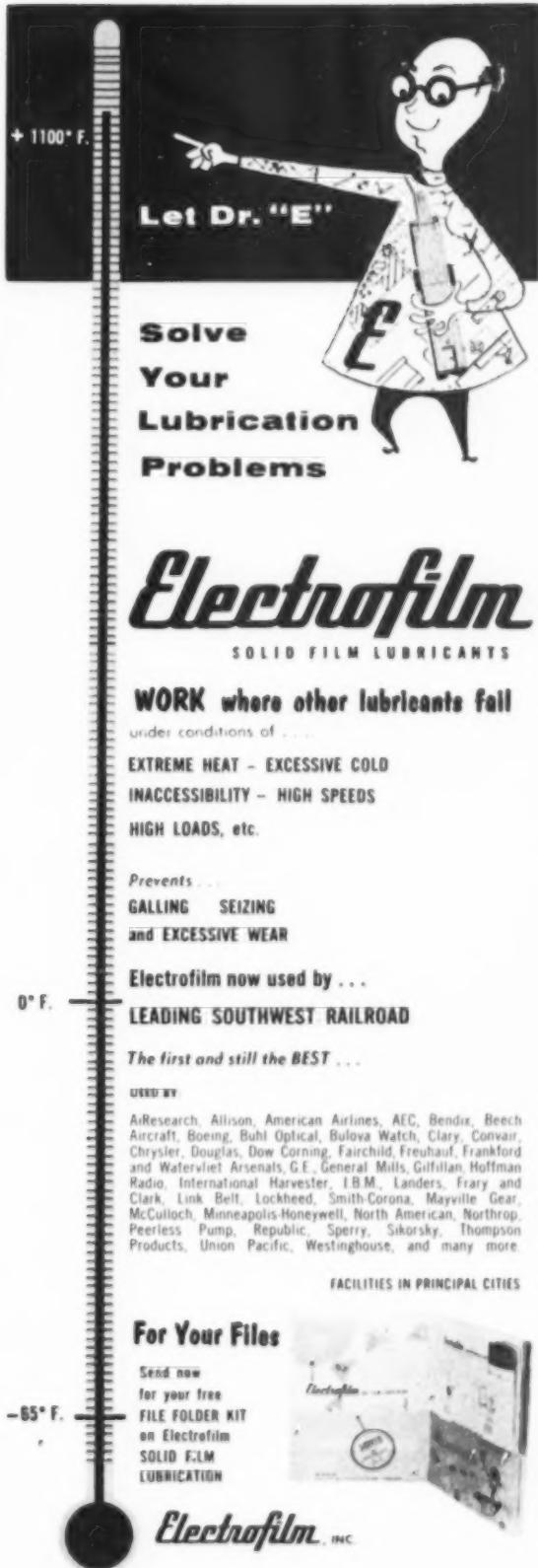
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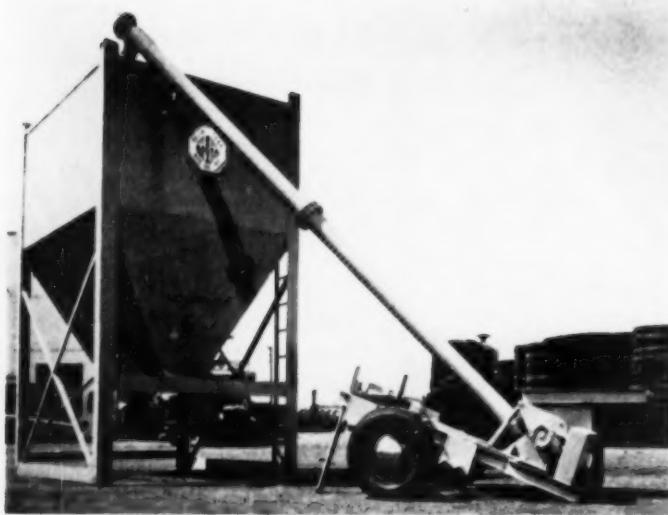
TULSA, OKLAHOMA

Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio



# Equipment..Supplies..Methods

FOR FREE INFORMATION—Circle code number on pages 16 & 17



The long arm of Delta Tank Manufacturing Company's new "Ba-zooka" conveyor loads all types of granular products into storage or shipping containers. Elevating screw can be adjusted to heights ranging from 6 to 16 ft.

## "Ba-zooka" Conveyor

**L-1** DELTA TANK MANUFACTURING CO., INC., Baton Rouge, La., has announced it has developed a full line of equipment designed for the transport and handling of barite, cement and other types of dry granular products.

The new Delta units include a portable two-screw product conveyor identified as the "Delta Ba-zooka," a water-tight steel plate shipping container which can carry up to 5,000 pounds of barite, and a giant mud hopper with a 540 cu ft capacity.

The two-wheeled trailer-type "Ba-zooka's" elevating screw can be adjusted to heights ranging from six to sixteen feet. Designed for use wherever granular products are handled in bulk form, the unit is powered by a self-starting, two-cylinder Wisconsin engine.

The two-screw design permits the unit's feeding hopper to remain level with the ground at all times regard-

less of the elevating screw's delivery angle.

Water tightness is assured by special rubber-cored gaskets and loaded containers may safely be stored outdoors.

The units are designed for movement by fork lift truck.

## Water Softener Service

**L-2** ELGIN - REFINITE, DIVISION OF ELGIN SOFTENER CORPORATION, Elgin, Ill., is offering a water softener check-up service and making it available without obligation. Any zeolite water softener will be checked thoroughly by a competent field engineer who will submit his findings to the owner in a SECA (Softener Efficiency Cost Analysis) report. This report will show in exact figures and percentages what kind of a job the equipment is doing and

point out what to do in case of inefficient operation.

This check-up service was prompted by a survey which showed far too many water softeners in use today are operating considerably below normal efficiency.

It was found that operators are generally not aware that simple steps can be taken to increase soft water output, cut regeneration and salt costs, protect and prolong equipment life, and bring about other operational improvements. Such being the case, the check-up service was set up with the thought that improved operation of existing equipment would not only benefit present users but would help promote future growth of the water softener industry.

## Asbestos Sheet Packing for Refrigeration Field

**L-3** RAYBESTOS - MANHATTAN, INC., Packing Division, Manheim, Pa., has developed a new compressed asbestos sheet packing for head gaskets on refrigeration compressors.

The new sheet is the first ever developed solely for air conditioning and refrigeration use. An all-purpose sheet, it has proved as effective in sealing against all other Freons as against Freon-22.

The binder is a new type of Neoprene which has been specially extended. Seventy to seventy-five per cent of the sheet is asbestos—uniformly opened and coated prior to the critically controlled sheeting procedure.

Special ingredients and a change in sheeting techniques account for the ability of R-54 sheet packing to seal against all Freons.

R-54 has an average tensile strength of 3000 psi and a density of 1.10 oz per cu in. It will bend 180

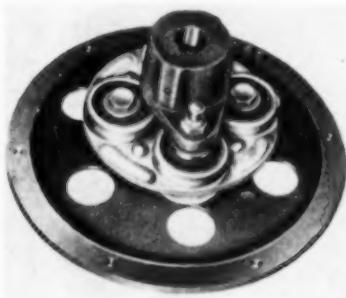
degrees without cracking over a rod with diameter four times the thickness of the sheet.

The new compressed asbestos sheet packing is available from all leading gasket cutters and is being introduced to refrigeration parts distributors. It is furnished in standard thicknesses of 1/64 in. through 1/8 in. and in eleven sheet sizes ranging from 40 x 40 in. to 150 x 150 in.

#### Flywheel Coupling Units

MORSE CHAIN COMPANY,  
L-4 7601 Central Ave., Detroit  
10, Mich., has introduced a new line of Morflex flexible coupling units that attach to the flywheels of industrial engines.

These units are ideally adapted to a wide variety of industrial machinery drives using industrial engines as the power source where a long-life, torsionally flexible, shock-resistant, weatherproof coupling for flywheel-to-driveshaft connection is required.

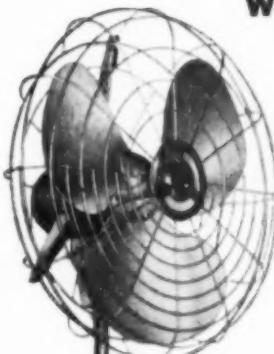


Morflex flywheel couplings have a standard Morflex coupling center member consisting of two plated steel stampings riveted together and enclosing four neoprene biscuits. A balanced cast iron adapter plate is bolted to one side of the center member through the bushings of two opposite biscuits. This adapter plate is attached to the engine flywheel through flywheel clutch bolt circle holes.

A standard Morflex forged steel flange is bolted to the other side of the center member through the other pair of bushings in opposite biscuits. This design provides a unit that is torsionally flexible, simple to install (no hole drilling or machining of flywheel is necessary) and avoids vibration resulting from misalignment and load reversal. The units require no lubrication or other maintenance. They are not affected by oil, dirt, grease or water.

# CUT COSTS

with **EMERSON-ELECTRIC**  
**AIR CIRCULATORS**

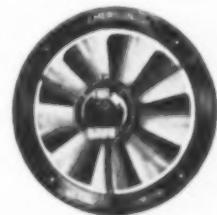


If stale, dead air handicaps your employees and drives customers away, it's costing you money.

You can cut this cost with Emerson-Electric Air Circulators. They move large volumes of air quietly . . . to keep "living conditions" inside your buildings comfortable and pleasant in all seasons. Don't let bad air add to your overhead . . . send for complete installation data today.

#### EMERSON-ELECTRIC AIR CIRCULATORS

Backed by the famous 5-Year Factory-to-User Guarantee, these powerful fans are available in 24" and 30" blade sizes, with two-speed, ball-bearing capacitor-type motors lubricated for 6,000 hours' service. Your choice of floor, counter, wall or ceiling mountings. For further information see your electrical contractor or write for Bulletin No. 794.



#### EMERSON-ELECTRIC EXHAUST FANS CUT COSTS, TOO!

For complete ventilation of your buildings investigate Emerson-Electric's complete line of direct- and belt-drive exhaust fans, in capacities ranging up to 19,350 c.f.m. Write for new catalog No. 794-A.

THE EMERSON ELECTRIC MFG. CO., St. Louis 21, Mo.

**EMERSON**  
FANS • MOTORS  **ELECTRIC**  
APPLIANCES

## Equipment . . Supplies . . Methods (Continued)



LeTourneau Jib Crane revolves 360° in either direction to serve up to 1936 sq ft of floor space. Pillars can serve as centralized outlet for air and electric services and storage for hoses and cords.

### Self-Supporting Jib Cranes

R. G. LE TOURNEAU, INC., Longview, Texas, announces the production of self-supporting jib cranes with capacities from 6 to 15 tons for the manufacturing and materials handling fields.

The LeTourneau Jib Crane is a self-supporting, full-revolving crane of all-welded steel construction. Its vertical column takes up less than 5 sq ft of floor space—yet the jib span serves an area of 1936 sq ft.

Crane is designed specifically for the continuous lifting and handling operations encountered in heavy materials production. It is ideal for servicing machine tools, assembly areas, dipping tanks and assembly line areas.

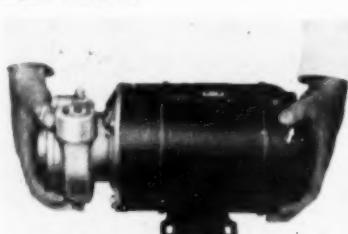
It is a valuable auxiliary unit for loading and unloading of common carriers in railroad yards, at loading docks, receiving docks and in certain storage areas.

Roller bearing ring permits continuous swing of jib when under load, assuring fast, efficient operation. Ball joint and ball thrust socket provides for quick installation, positive suspension and free and easy jib operations.

### Close-Coupled Pumps

BYRON JACKSON CO., P. O. Box 2017, Terminal Annex, Los Angeles 54, Calif., announces new type L1, Bilton Pumps, an addition to their close-coupled pump line, featuring a BJ Mechanical Seal as standard equipment.

This seal is emphasized as contributing to low-cost pump operation because it replaces the conventional packing and eliminates the repacking problem, controls leakage, guards against contamination of pumped liquids and protects against volatile liquid hazards.



These new pumps are single stage, single suction with an enclosed impeller and require no rigid foundation or base. They deliver up to 80 gpm at 75 ft head and handle up to

150 ft heads at lower capacities. Temperatures to 150 F and suction pressures to 75 psi can be handled. Pumps can be mounted vertically, horizontally or at any angle and pump cases can be rotated for horizontal or vertical discharge. Due to their close-coupled construction, there is no shaft alignment problem.

### Light Weight Tube Cleaner

THE AIRETOOL MFG. CO., 304 S. Center St., Springfield, Ohio, is offering a new lightweight condenser tube cleaner capable of cleaning completely plugged tubes up to 1" I.D. and smaller.

One of the main benefits of the condenser cleaner is that weighing only 11 pounds, it can be used by only one operator instead of two as on the heavier type outside mounted condenser cleaners.

The new cleaner operates at a high speed and cleans very fast. It is also equipped with a muffler to reduce exhaust noise to a minimum. It is especially effective when used with the carbide tip drill for cleaning hard deposits.

The flushing system for the new cleaner is built in, and features a quick shut-off valve for water feed. It is equipped with either a regular handle or a sleeve valve handle for controlling the flushing agent which also cools the drill. The air supply valve has an easy-to-operate trigger to start and stop the piston, and also to regulate speed. The valve automatically shuts off when the trigger is released.

### Dual-Jack Hydraulic Lift

ROTARY LIFT CO., 1054 Kansas, Memphis, Tenn., is producing a new dual-jack hydraulic lift capable of handling 12,000 lb.

This new Rotary Levelator Lift is designed to raise loads from plant floor to trucks or different floor levels. Loading dock and ramps are eliminated, plant traffic is speeded and materials handling costs cut.

The lift has a 6' x 12' platform of non-skid steel plate—large and strong enough to accommodate a loaded industrial power truck. The dual hydraulic jacks will raise it 5'5" above the plant floor. Lowered, the lift becomes part of the floor and can be trucked over.

Operation is by safe, dependable, economical Oildraulic power. Installation is simple in old or new buildings.

#### Delta Drill Press

**L-9** **DELTA POWER TOOL DIVISION OF ROCKWELL MANUFACTURING COMPANY, 400 N. Lexington Ave., Pittsburgh 8, Pa.** has introduced a new 14-in. drill press designed to speed production, reduce operator fatigue and facilitate precision work.

Accurate and rugged enough to meet the exacting requirements of industrial and commercial wood and metalworking shops, the machine is also priced low enough to be completely practical for small-budget school shops and home workshops.

In addition to important new features, the machine offers such standard Delta drill press features as balanced pulleys, self-aligning floating drive and interchangeable spindles.

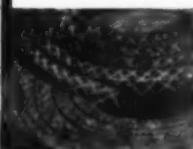
The new machine is available in single or multiple spindle models, high or slow speed, Morse taper or key chunk, standard or production tables, floor or bench type—40 models altogether. Single spindle models sell for \$88.50 (delivered price; western region prices slightly higher) for a bench model and up.



# BELMONT PACKINGS



Service conditions are constantly becoming more extreme. The success or failure of a piece of industrial equipment is many times dependent upon whether or not it can be properly sealed against loss of pressure, liquids or gases. Belmont for over sixty years has kept pace with the ever changing demands, offering a wide scope of packing materials to satisfactorily meet the toughest services. You can get them ALL from ONE SOURCE of SUPPLY. Get in touch with your nearest stocking Belmont distributor or mail us your specifications. Write for new condensed catalog #54.



#### BELMONT "TEFLON"

For corrosive liquids—furnished in sheets, gaskets, rings, tape, plastic, molded bars and sleeves, extruded rods, spiral shapes, blue asbestos and white asbestos suspensoid.



#### BELMONT "O" RINGS

Made to close tolerance from synthetic and natural rubber, "Teflon", Silicone, for dynamic and static seal applications working against air, oil, steam, water, acids.



#### BELMONT ROD PACKINGS

Like the one illustrated (Belmont 30), our many constructions have special features dependent upon services — asbestos, rubber and duck, plastic, metals, flax, jute, cotton, ramie.



#### BELMONT GASKETS

Woven asbestos boiler manhole and handhole; rubber and synthetic molded, extruded, die or lathe cut; compressed asbestos; vegetable fibre.



#### BELMONT LEATHER PACKINGS

Cup, flange, U and V shaped and washers in special tannages and treatments as service warrants.

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## Equipment . . Supplies . . Methods (Continued)

### Pipe Strainers

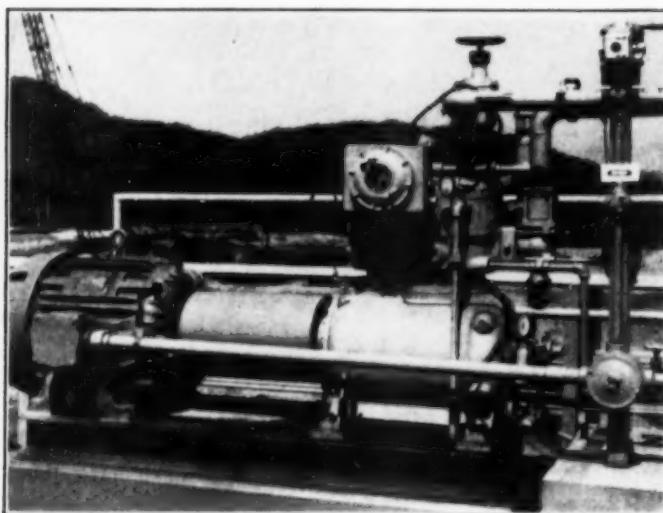
ARMSTRONG MACHINE WORKS, Three Rivers, Mich., has introduced a new line of cast semi-steel Y-type pipe strainers for use in steam, air, water, oil and gas lines at pressures to 250 pounds.

There are eight sizes from  $\frac{1}{4}$ " through 2".

Straight bushing threads instead of pipe threads ease removal of bushing and screen. A copper-asbestos gasket is positioned between the base of the bushing and the body, eliminating the possibility of gasket blowout. Only a



light torque is required to assure a leak-tight seal. Type 430 stainless steel corrosion-resistant screens are



### Dual Purpose Compressor in Tennessee Plant

AT Kingsport, Tennessee, Tennessee Eastman manufactures industrial chemicals, acetate yarn and staple, and cellulose ester plastics.

One of the chemicals handled is propane. This is stored at Kingsport for stand-by purposes, in a field of tanks.

A Frick 3-cylinder  $3\frac{1}{2}$  x  $4\frac{1}{4}$  "Eclipse" AHP compressor is used for transferring propane from the railway cars to the storage tanks. The machine is driven by a direct-connected motor of the explosion-proof type, and is equipped with controls of the same kind.

The Frick machine serves a dual purpose: it can be used to relieve the gas pressure in the top of the storage tank about to be filled, the gas collected being pumped into the top of the tank car; or it can be connected directly to the tank car for pumping out and saving the gas remaining when the liquid has been drained.

standard, either perforated with 225 holes of .045" diameter per square inch or 20 x 100 mesh wire cloth. Screens of other materials are available on special order.

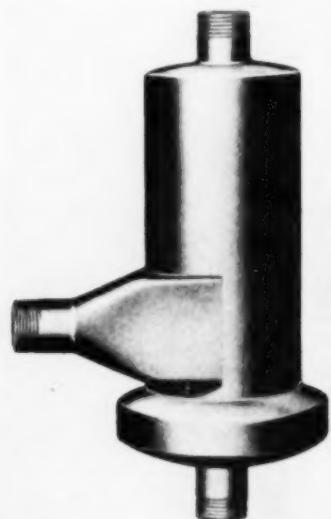
### Water Separator Snubber

BURGESS - MANNING COMPANY, Libertyville, Ill., has announced a new device that simultaneously performs the twin functions of water separation from water-sealed vacuum pumps exhausts and control of exhaust noise.

Both water and air enter the side of the Separator Snubber and are separated centrifugally within the unit. The water-free air is then discharged at the top of the Snubber and water leaves the unit at the bottom. The WSS Separator Snubber allows for handling of water having a percentage of settling and other impurities, and can be cleaned conveniently when necessary.

Although water separation is the prime purpose of this new Snubber it also reduces the discharge noise from the vacuum pump sufficiently for most commercial installations. For critical installations where optimum silencing is required, a standard Snubber may be installed anywhere in the line leading from the water separator Snubber.

Standard snubbers range from 6 to 26 inches in diameter and weigh from eight to 415 pounds, and handle from 60 to 4,700 cubic feet per minute.



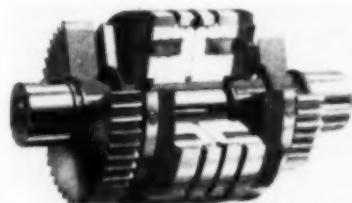
effectively extracts 100% of water from water-sealed vacuum pump exhausts and simultaneously reduces noise from the gas discharge to ear comfort level.

### Electromagnetic Clutch

**L-12** THE I-T-E CIRCUIT BREAKER COMPANY, Rectifier Division, Philadelphia 30, Pa., announces a new design in Electromagnetic Clutches. The I-T-E Electro Clutch fits the requirements of transmission employing constant mesh gearing.

Current application is machine tools. However, future contemplated uses of the clutch include fan drives, cranes, hoists and other machinery.

Clutch design provides constant horsepower output, quiet operation and rapid speed change. Clutch is controlled by a 24 volt d-c circuit and no field adjustment of the torque value of the clutch can be made. Maintenance is reduced to a minimum since the clutch is self compensating and no adjustment for wear of the clutch plates is ever required.



I-T-E's Electric Clutch has many applications in modern power transmission where several output speeds are desired with a constant input speed.

Operating and applicational details are featured in the company's 14-page Bulletin 5306. Circle the above code number for your free copy.

### Granule Principle Used in Fume & Smoke Control Units

**L-13** MECHANICAL INDUSTRIES, INC., 953 Grogan Bldg., Pittsburgh, Pa., has introduced the Dorfan Impingo Filter, by which the control of fumes, dust and smoke is accomplished by a unique moving granule principle, rather than by conventional cloth-type bags or water sprays.

The unit is adaptable to the air and fume systems of new or existing plants. It also can be used for by-product recovery.

In the Impingo Filter gases are passed horizontally through two or more cells containing moving granules. Granules of a variety of types of materials are used, depending on the type of filtering being done. The granule cells are arranged in parallel, or in series, and the rate of flow in each cell is controlled by a rotary discharge valve.

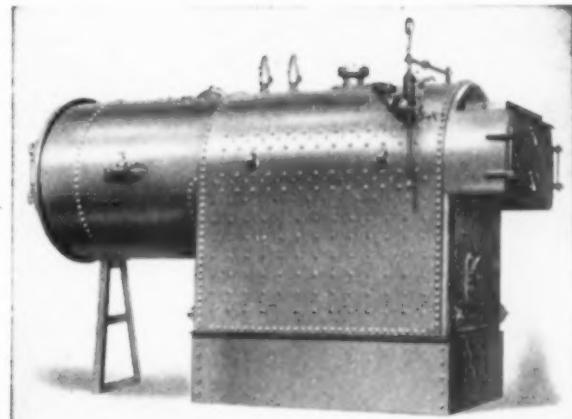
As the gases pass through the cells, solid matter "impinges"—that is, strikes—against the granules and adheres. The clean gases then pass through labyrinth in the granules to the exhaust system beyond the cells.

The simplest type of Impingo Filter is a two-cell, parallel-flow system. The descending cross section of each cell increases in area. This inhibits "hang up" of granules as they move downward and also provides room for the increased volume resulting from the collection of impinged dust. After

the dirty granules pass from the cells, they may be washed and then recirculated through the top of the cells mechanically. Each cell is louvered on two faces to allow the gas to pass through.

The filters are recommended by the manufacturer for use in controlling fumes or smoke in electric steel furnaces, coke quenching operations, dryers of all types and other installations where high temperature, moisture or corrosive conditions are present.

## POWER with POWER to spare



### A NEW DOUBLE PASS ALL-PURPOSE INDUSTRIAL AND HEATING BOILER

**SOUTHERN MADE FOR SOUTHERN TRADE**

Made in sizes from 44 H.P. to 153 H.P. S.B.I. rating with pressure to 150 lbs. Designed for coal, gas or oil firing, the New Lucey Double Pass Boiler can be furnished complete as a package unit.

This boiler is in addition to our regular line of single pass fire box boilers which we have been making since 1918.

WRITE FOR BULLETIN NO. 153 FOR COMPLETE SPECIFICATIONS

## LUCEY BOILER AND MANUFACTURING CORPORATION

**CHATTANOOGA.**  
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CHATTANOOGA

**TENNESSEE**  
1312 STERLING BLDG.  
HOUSTON, TEXAS

## new equipment (continued)

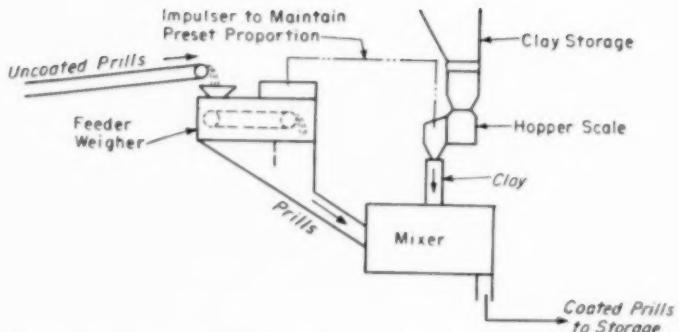
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on the postage free post card — p. 17

### Weight-Control System for Blending Process Materials

**L-14** RICHARDSON SCALE CO., CLIFTON, N. J., announces a new remote weight-control system for continuously and accurately blending additives with process material.

Features of the system include the batch weighing of additives, continuous weighing of process material and the remote selection of weight ratios using a single dial control. Advantages are rigid process control, immediate start-up, quick formula changing, precise weighing of additives, and operation over a wide range of weight ratios.

Products handled include chemicals, foods, feeds, fertilizers, tobaccos, plastics, and cement and rock products. Components of the system are an automatic hopper scale, electric control system, control panel and a constant-weight belt feeder.



Process material drops on belt feeder and discharges into mixer. Batches of additive material are weighed out and automatically discharged into same mixer. Signal for the discharge of additives is transmitted via an impulser on belt feeder. Thus, flow of material leaving belt feeder determines the rate of discharge of additive material.

A typical system, recently designed by Richardson, blends clay and prills. (The clay serves as a coating for the prills to prevent them from sticking together.) Weighing equipment for this system consists of a Richardson E-20 constant-weight, variable-speed belt feeder and a Glengarry Injecto-Weigh scale. Prills are fed continuously from a belt conveyor to the belt feeder (see sketch), which automatically compensates for small changes in feed rate and density.

How the constant weight is maintained: The action of the feeder's weigh-beam opens and closes magnetic mercury switches that drive a small control motor forward or reverse. The action of the motor varies the resistance in a potentiometer that is geared to a  $\frac{1}{4}$ -hp, variable speed, d-c drive motor. This causes the drive motor to slow down or speed up, thus assuring a constant-weight delivery.

The belt feeder is capable of compensating for 10%/min changes in weight of feed passing over it. For this operation the feeder has been set to hold 10 lb/ft of belt. Totalizing and reset counters record weight directly in pounds.

Every half-pound of material discharging from the feeder produces one impulse. After the preset number of impulses the Glengarry discharges a batch of clay. Up to 400 impulses may be received by the scale before discharging.

The Glengarry unit is made up of an inlet hopper, a vibrating feed trough and a small weigh-hopper. Clay is fed to the weigh-hopper by the vibrating trough. The feed is automatically shut off when a pre-set weight is reached.

An alarm is sounded and indicated by a light on the control board if the Glengarry is feeding too slowly. Alarm lights go on and a horn is sounded also when the Glengarry or the belt feeder is weighing excessively heavy or light. This happens whenever errors exceed 3%.

Besides these signals, the panel control board contains stop-counter dials for selecting weight ratios, start and stop pushbuttons, a stop-counter reset button, a power-on light, a system-running light, and alarm reset and silencer buttons.

## EXTRA YEARS

OF MORE DEPENDABLE POWER  
and at less cost per pound of steam

## TODD BURNERS

GAS OR OIL

COMBUSTION EQUIPMENT DIVISION  
TODD SHIPYARDS CORPORATION

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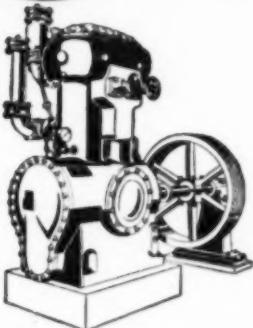
Elmhurst 73, N. Y.



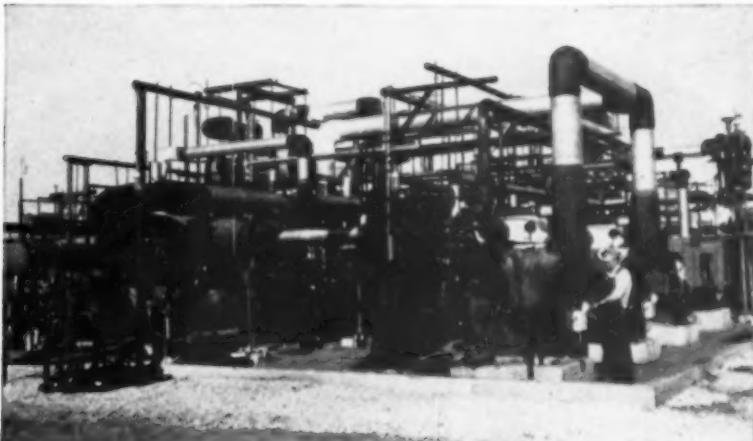
Below Right: Three of the six Frick refrigerating machines in service at Big Spring, Texas.

## Para-Xylene

★ A New Phillips Product  
★ A New Application of  
Refrigeration



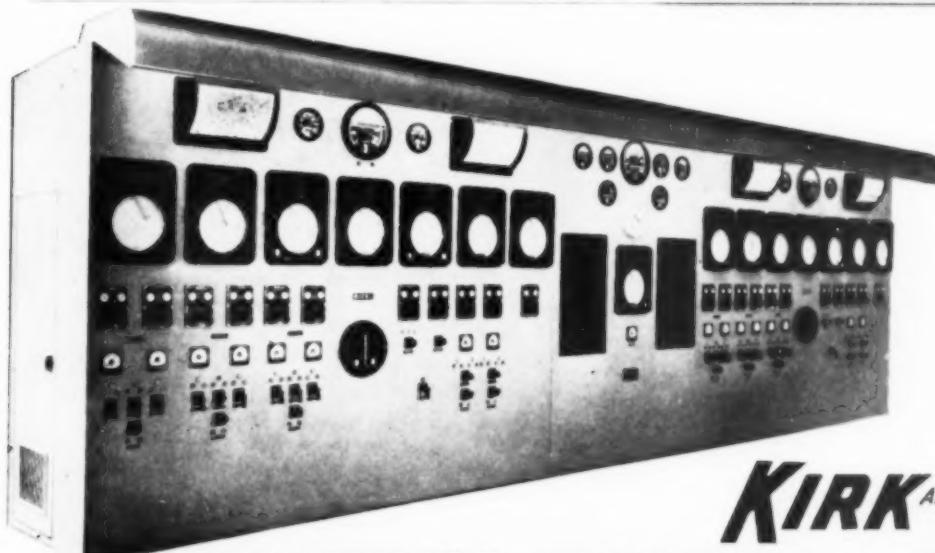
Frick two-cylinder enclosed refrigerating compressor similar to those installed at Big Spring. Also, complete line of "ECLIPSE" multi-cylinder compressors for any refrigerant and any service.



Phillips Chemical Company's new plant near Big Spring, Texas, is the first in the country to produce 98% pure para-xylene (used in the manufacture of a synthetic fibre) in commercial quantities.

The new, revolutionary process, patented by Phillips, involves continuous fractional crystallization. The heart of the system is a Frick "cascade" low-temperature refrigerating plant that FREEZES OUT para-xylene crystals. Whether your process is in the idea, development or production stage—if it involves refrigeration or air conditioning, get in touch with your nearest Frick representative, or write directly to

Frick representatives are located in principal cities throughout the U.S.A.



## KIRK AND BLUM CONTROL PANELS and DESKS

### FOR INDUSTRIAL PLANTS and UTILITIES

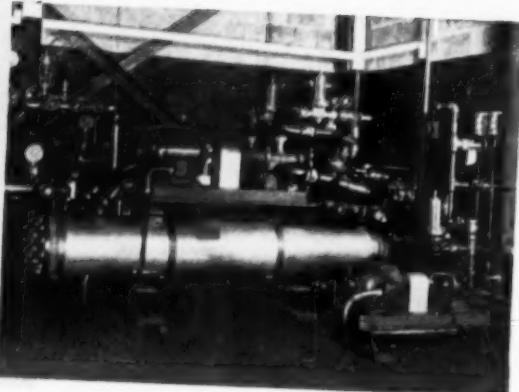
For fabrication of control panels, desks and consoles, in any size, in any quantity . . . for any power plant requirement, call on Kirk & Blum. Steel and alloy fabrication . . . sheets, plate and light structurals . . . has been a Kirk & Blum specialty for more than 47 years. Exceptional experience and complete facilities up to  $1\frac{1}{2}$  in steel, stainless, aluminum, monel and other alloys.

Send prints for prompt quotation or write for your copy of the latest Kirk & Blum Sheet and Plate Fabrication catalog.

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**2  
ENCO  
FUEL  
OIL  
UNITS**  
*in this plant*



Here is a typical 2 unit installation of Enco fuel oil pump sets—selected to take care of all the requirements of a building materials manufacturer.

The Large Unit has 2 pumps and 2 heaters, completely automatic and arranged for operation with either heater, or either pump—or both. With one heater and pump the capacity is 11 gpm Bunker C oil at 300 psig pressure, and temperature rise from 90°F to 230°F.

The Small Unit is for cold starting

up—has no heater. The capacity is 3 gpm of No. 2 oil at 300 psig pressure.

All Enco sets are individually designed, each for specific plant conditions—for easy installation, low maintenance and minimum carefree operation.

Complete details including the 10 important features of Enco fuel oil heating and pumping sets are given in Bulletin OB53. Copies gladly sent upon request.

**THE ENGINEER COMPANY, 75 West Street, New York 6, N. Y.**  
In Canada: Rock Utilities Ltd., 80 Jean Talon St. W., Montreal, P. Q.  
Palser Enterprises, 378 York St., London, Ontario

EC-807



**new equipment (continued)**

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on the postage free post card — p. 17

**Package Boiler Requires  
Minimum of Floor Space**

**L-15**  
LIVINGSTONE ENGINEERING COMPANY, 100 Grove St., Worcester, Mass., announces a completely new line of electric steam generators requiring a minimum of floor space when installed alongside plastics presses, rubber rolls, jacketed kettles or other steam using equipment.



These new "SPEEDY ELECTRIC" packaged boilers require approximately one-half square foot of floor area per boiler horsepower. Incorporated in a single boiler drum is the same self-regulating control that previously required two drums. This built-in feature, without pressure switches or magnetic contactors, continuously and automatically regulates the input of electric power to exactly balance the steam load, and at the same time maintains precise non-fluctuating steam pressure at the desired setting. The steam generators are available in standard sizes from 1½ to 60 bhp and pressures to 500 psi, and operate at over 98½% efficiency and 100% power factor.

There are no coils or heating elements to burn out, no boiler tubes or burners to clean, and no baked scale because no part of the boiler is ever hotter than the steam generated. Safety features include freedom from gases, flame or fire hazards. Low water danger is completely eliminated because the steam is generated by the

resistance of the boiler water to the passage of electric current between solid metal electrodes; therefore, if there is no boiler water, no current flows and no heat is generated. The generators are available for 220, 440 or 550 volt, single or polyphase a-c power.

### Sectional Belt Conveyor

STEPHENS-ADAMSON MFG. CO., Aurora, Ill., now offers a complete set of belt conveyor components pre-engineered for customer assembly. Units are designed for lengths up to 50 ft and from 51 ft through 100 ft in both 18 and 24 in. belt widths. Limiting capacity for 18-in. belts is 150 tons per hour and 24-in. belts 250 tons per hour.

Saco Sectional Belt Conveyor components include the new S-A 745 carrier and return roll, head and tail pulley assemblies, drive assembly, normal duty roller type holdback, spring type belt cleaner, bent plate decking, belt and Swivelpiler for extending storage area at conveyor dis-

charge. Users may choose either a Saco speed reducer drive with overhead motor mounting or a shaft mounted reducer.

All conveyor components are available from stock and can be purchased as a package unit for a complete belt conveyor installation or as repair or replacement units on existing conveyors.

### Magnetic Floor Sweeper

THE HOMER MANUFACTURING CO., INC., Lima, Ohio, has introduced magnetic floor sweepers, which remove nails, wire and other magnetic material from roads, streets, airports, construction jobs, machine shop and factory aisles, loading areas, etc.

The use of the new sweepers is said to pay for the sweepers themselves in a very short time in savings of tires, tire repairs, down-time, personnel safety, and recovery of valuable scrap material.

The sweepers consist of a permanently energized Alnico V magnet assembly, mounted on semi-pneumatic



tires, with ball bearing wheels. Handles are of tubular steel with plastic handle grips. Handles are adjustable to two positions; for manual use, or for towing with truck or other vehicle. Handle and wheels are quickly removed and the magnetic assembly can be used for suspended sweeping with fork or industrial lift truck; eye bolts are furnished to facilitate suspension.

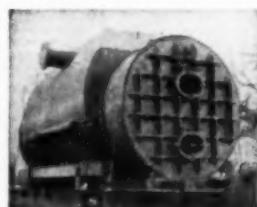
# POSITIVE IDENTIFICATION



THIS  
IDENTIFIES  
YOU



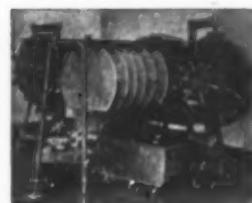
THIS IDENTIFIES  
THE BEST IN  
HEAT TRANSFER  
EQUIPMENT



CONDENSERS

If you are shopping around for Condensers, Evaporators, Closed Heaters, Refiners, Filters, Steam Jet Air Ejectors, Deaerators, in fact, anything in heat transfer equipment, you need the latest CONDENSER SERVICE catalog.

Write or call today. We will be glad to send your copy by return mail.



REFINER FILTERS



Condenser Service & Engineering Co., Inc.

HO 3-4425

154 Observer Highway, Hoboken, N. J.

N. Y. Tel. BA 7-0600

## new equipment (continued)

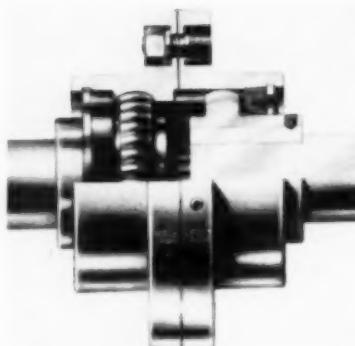
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### Sphereflex Couplings

**L-18** PHILADELPHIA GEAR WORKS, Erie Ave. and G St., Philadelphia 34, Pa., is offering the "Sphereflex" coupling, featuring gear teeth which are cut on a segment of a sphere.

The new coupling, which has been applied successfully in aircraft and other specialized fields, is offered at competitive price levels with regular couplings.

As the name implies, the male teeth of each coupling half are cut on a true spherical arc while the internal teeth are cut with a straight root. Thus, whenever misalignment occurs, the curved tooth maintains a constant area of contact with the internal tooth. No longer is coupling flexibility dependent upon excessive backlash between coupling teeth, point contact, or springs. Size for size, the Sphereflex coupling will



withstand higher horsepower and greater misalignment than any comparable coupling.

### LPG Powered Truck

**L-19** CLARK EQUIPMENT COMPANY, Battle Creek, Mich., has introduced a fork-lift truck powered by liquified petroleum gas, approved by Underwriters' Laboratories.

The LPG-Carloader is a standard model in 3000-5000 lb capacities,

equipped with conventional transmission, factory-modified for LPG operation.

LPG, in normal commercial usage a mixture of butane and propane under pressure, is a desirable fuel because it burns clean without giving off obnoxious fumes and leaves no unburned carbon, lead compound or varnish deposits. Because it is a dry gas, there is no liquid to dilute the cylinder lubricant or crankcase oil. The result is less wear on cylinder walls and bearings, and longer life for the lubricating oil.

The fuel unit consists of a heavy-duty fuel tank, vaporizer-regulator and a simple, rugged air-gas carburetor. The system draws fuel from the tank in liquid form and is vaporized before it reaches the manifold. This means that even in extremely cold weather, there is little difficulty in starting.

Since the fuel is under its own pressure at all times in the tank, the need for a fuel pump is eliminated. A solenoid valve automatically opens or closes the fuel line by the ignition switch, and serves as a positive lock-

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off when the engine is stopped. As another safety precaution, a vacuum switch has been placed between the ignition and the manifold which prevents fuel from being drawn into the engine until the engine is turned over.

The engine is modified to operate at a high compression ratio (8 to 1) to take better advantage of LPG's higher octane rating and to provide maximum efficiency, fuel economy and engine power. Also, a cold intake manifold is used, since the fuel is already a gas when it enters the manifold and does not require a hot spot as does gasoline.

To provide longer engine life, stellite-faced valves and seats and positive valve rotators are used in the LPG-Carloader engine, the manufacturer reports. These are desirable, because LPG has a tendency to burn conventional valves due to its higher flame temperature.

To refuel the truck, the fuel tank is removed in a matter of minutes and simply hooked to the LPG storage unit and fuel pumped in; a hand pump can also be used effectively. Spare tanks are available if it is desired to keep a stand-by full tank. The fuel tank is rated at 1600 pounds pressure, and is equipped with a safety-relief valve which by-passes pressure in excess of 275 pounds.

#### Packaged Air Compressor

**L-20** INGERSOLL-RAND COMPANY, 11 Broadway, New York, N. Y., has introduced a packaged air compressor in the 75-100 horsepower range that approaches the efficiency and economy of larger, more powerful, slow speed compressors.

The new machine, known as the PHE, is an opposed-cylinder, balanced design driven by a direct connected, induction motor. It is a packaged, ready-to-run, heavy duty unit, arranged in single or multi-stages. The basic design is a two-stage unit for 80-125 psi, but other cylinder arrangements are available for higher pressures or for pumping vacuums.

Designed with present day economies in mind, the PHE requires very little floor space, a simple foundation and a minimum of piping and connections. It is suitable for factories, foundries, railroad shops, mines, powerhouses and large construction jobs.

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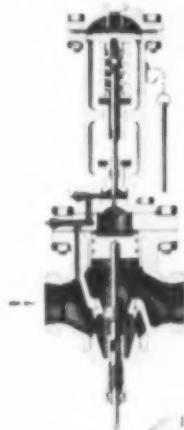
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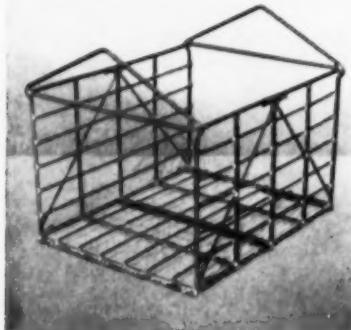
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## new equipment (continued)

For more data circle item code number on the postage free post card — p. 17

### Industrial Protective Glove

**L-21** THE CHARLESTON RUBBER COMPANY, Stark Industrial Park, Charleston, South Carolina, has announced a new all-neoprene protective glove for industrial use.



The glove is black with a red roll at the cuff and a red inner lining. It is made with curved fingers, to facilitate easy natural use, and with either roughened hand or smooth finish. The glove is being marketed in five sizes, four weights and in lengths of from 10½ to 18 inches.

### Electronic Flowmeter

**L-22** HASTINGS INSTRUMENT COMPANY, Inc., Hico Instruments Division, Warwick, Va., announces an electronic flowmeter for instantaneous direct readings of gas flow in 50 to 10,000 cc per min., ranging from an indicator small enough to be held in the palm of the hand.

Directly heated thermocouple gauge tube can be placed in line for low flow rates with practically no pressure drop in line. Unit can be used with long extension cables for remote indications.

Logarithmic calibration provides ease of reading in low flow ranges. Response time  $\frac{1}{2}$  second. Accuracy  $\pm 2\%$ . Instrument may also be calibrated

for measurement of mass flow in pounds of air or gas.



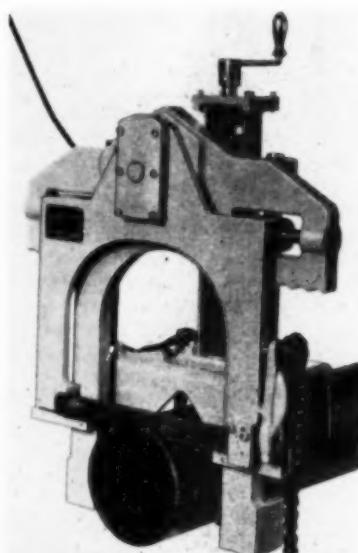
Applicable for process control and quick line checks.

### Portable Power Saw

**L-23** THE E. H. WACHS COMPANY, 1525 N. Dayton St., Chicago 22, Ill., has introduced a portable power pipe saw weighing only 120 lb and operating in a space 25" wide.

Chain pipe vise clamps Guillotine Saw to pipe, ready to cut. Machined cast steel V saddle base assures a square cut at right angle to pipe. Pipe acts as machine tool base.

Pipe is cut in a matter of minutes—6" standard wall steel pipe cut in 8 minutes—6" standard wall cast iron pipe cut in 4 minutes. Cutting time depends on pipe characteristics.



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### Steam, Air, and Gas Power

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PUBLISHED BY JOHN WILEY & SONS, INC.  
440 Fourth Ave., New York 16, N. Y.  
502 pages  
Price, \$6.50

The authors have revised the fundamental material of earlier editions in this Fifth Edition. Emphasis has been shifted to reflect well established trends in current engineering practice, and valuable new material has been incorporated.

The discussion of gas turbines has been expanded. There is a new chapter on mechanical refrigeration. The section on air compressors has been broadened to include centrifugal and axial-flow types. Specific heat information has been added in the ther-

modynamics chapter. Material on fuels and combustion has been augmented by sections on the combustion of oils and gases. The general plan of the book follows the logical arrangement of earlier editions.

### Timestudy for Cost Control

BY PHIL CARROLL  
PUBLISHED BY McGRAW-HILL BOOK COMPANY  
330 West 42nd St., New York 36, N. Y.  
301 pages  
Price, \$5.00

This is a simple, practical manual making timestudy and control, based on predetermined standards, useful in the medium and small sized plant. The book (third edition) shows how to select men for timestudy work and gives step-by-step procedures from how and where to start, to the application of data in production control. It includes such topics as analyzing timestudy results, building standard data and data work sheets, getting incentive performance, and maintaining correctness in standards.

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1916 Race St., Philadelphia 3, Pa.  
370 pages  
Price, \$3.75

This 1951 edition, sponsored by ASTM Committee A-1 on Steel, contains in their latest approved form the 53 widely used ASTM specifications for carbon-steel and alloy-steel pipe and tubing, including stainless.

Twenty-two of the specifications included in the previous edition have been revised, with 17 of this number as tentatives and 5 standard. A new specification covers ferritic alloy steel forged and bored pipe for high temperature service. Then emergency alternate provisions are included.

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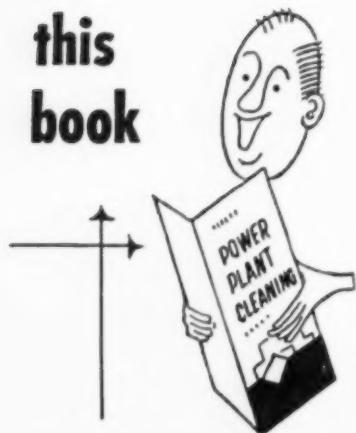
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## WHAT'S NEW and Where to Get It

FOR FREE INFORMATION—Circle code number on page 17 or 18

**W-1 EXHAUST FANS**—Catalog No. 500-B—Features the S-2 Exhaust Fan, describes various applications, types and construction. Complete dimensional data and capacity tables to assist in selection. Engineering data for standard and long cone Cyclone Separators included.—FORT WORTH STEEL & MACHINERY CO., Box 1928, Fort Worth 1, Texas.

**W-2 ALUMINUM JACKETING**—Folder No. J-25, 4 pages—Contains complete application instructions for Childers jacketing for weather-proofing of insulated lines, towers, vessels, and tanks. Illustrated with detailed drawings.—CHILDESS MANUFACTURING CO., Box 7447, Houston 8, Texas.

**W-3 COOLING TOWERS**—Bulletin "Econ-O Water-Saver," 2 pages—Lists principal features of natural draft cooling towers for industrial and other uses. Gives specifications. Engineering data includes tables of dimensions and capacities. Illustrated.—ENGINEERED PRODUCTS CO., 524 Locust St., Gadsden, Alabama.

**W-4 INDUSTRIAL TRAPS**—Bulletin No. 800, 12 pages—Illustrates and describes the "Unitrap," an all purpose, universal steam trap for pressure ratings of 0 to 250 lb. Covers design, construction, operation, and other pertinent information. Includes steam pipe selection chart.—PERFECTING SERVICE CO., 332 Atando Ave., Charlotte, N. C.

**W-5 VIBRATION CONTROL**—Bulletin No. 500-1, 4 pages—The "Vibraswitch," a control device for monitoring or measurement of vibration caused by any type of malfunction, is described. Applications, vibration range, adjustment and acceleration measurement, are discussed. Specifications are given.—THE BETA CORPORATION, Box 8625, Richmond 26, Va.

**W-6 JIB CRANE**—Bulletin, 4 pages—Describes 6-ton pillar type, self-supporting jib crane, which operates between building columns without interference, permits continuous 360 degree pivoting of load without reversing direction; works with overhead crane or frees it for other work; and mounts in floor level foundation for maximum clearance. Illustrated.—R. G. LOUTREAU, INC., Longview, Texas.

**W-7 FLANGE LUBRICATOR**—Bulletin No. 541, 4 pages—Illustrates and describes the Naleco flange lubricator, which provides a simple, inexpensive, effective method of reducing flange wear by means of dry lubrication, using Moly sticks. Discusses application on both steam and diesel engines.—NATIONAL ALUMINATE CORPORATION, 6216 West 66th Place, Chicago 38, Ill.

**W-8 DRY-FLIM COATINGS**—Booklet, 4 pages—Lists 40 dispersions of colloidal graphite, molybdenum disulfide, vermiculite, and zinc oxide. Gives typical applications, densities, carriers, and other pertinent data. Includes new epoxy resins as bases for "dag" colloidal graphite and molybdenum disulfide dry-film coatings.—ACHESON COLLOIDS COMPANY, Division of Acheson Industries, Inc., Port Huron, Mich.

**W-9 MOLY SPRAY LUBRICANT**—Bulletin 102, 2 pages—Describes "Moly-Spray-Kote," a dispersion of micro-fine solid lubricants, principally molybdenum disulfide, in a propellant "Fluron," packaged in a self pressurized aerosol type sprayer, for producing a dry, extreme pressure lubricating film. Includes table of prices, general specifications, and application procedures.—THE ALPHA CORPORATION, Greenwich, Conn.

**W-10 MASONRY COATING**—Booklet, 29 pages—Describes "Dum Dum Masonic" for protecting and restoring masonry structures. Explains step-by-step applica-

tion. Photographs show specific cases in industrial use.—THE ALCO COMPANY, 7301 Bessemer Ave., Cleveland 27, Ohio.

**W-11 PACKAGED BOILERS**—Form No. WT-7, 8 pages—Packaged boilers with capacity range of 4,000 to 30,000 lb are described, including specifications and line drawings to show construction features. Illustrated with equipment and applicational photographs.—WY-BLOS B-ILER & MPG COMPANY, 1957 Tenth Ave., S.E., Minneapolis, Minn.

**W-12 THERMOSTATIC TRAPS**—Bulletin 11-52, 2 pages—Catalogs thermostatic traps of bronze construction, size  $\frac{1}{2}$ " and  $\frac{3}{4}$ ", pressures 0 to 200 lb. Gives capacities, dimensions, and general purpose applications. Illustrated.—STERLING ENGINEERING & MANUFACTURING CORP., 117 Business St., Hyde Park, Boston, Mass.

**W-13 AUTOMATIC LEVEL**—Booklet 10444, 4 pages—Describes the Compact Automatic Level, a new instrument for use in building, paving, excavating, machine erecting, pipe laying, and other industrial operations requiring precise, automatic leveling. Equipment and accessories are illustrated.—COMPACTIC DIVISION, ENGIN EQUIPMENT CO., 431 S. Dearborn St., Chicago 5, Ill.

**W-14 ELECTRIC HOIST**—Bulletin CQ, 4 pages—Illustrates and describes the Coffing Cable "Quik-Lift" Electric Hoist, designed for continuous use with a minimum of servicing. Illustrated, types available, gives specifications and uses.—COFFING HOIST COMPANY, Danville, Ill.

**W-15 CATALYTIC PURIFIERS**—Folder 4 pages—Catalytic exhausts for removing harmful exhaust fumes from internal combustion engines in industrial equipment are described. Discusses application for engines burning diesel, LPG or non-leaded gasoline. Units are illustrated.—OXY-CATALYST, INC., Wayne, Pa.

**W-16 WATER TREATMENT**—Technical Report T-129, 10 pages—Reprint of the paper, "Some Chemical Aspects of Hot Process-Hot Zeolite Plant Performance," presented at the American Power Conference by Graver engineers. Contains flow diagrams and other engineering data.—GRAVER WATER CONDITIONING CO., 216 West 14th St., New York 11, N. Y.

**W-17 PACKAGED BOILER CONTROL**—Bulletin 54-1988-239, 4 pages—Specifications for the fully automatic, all electric metering type packaged control for shop assembled boilers are given. Schematic drawing shows a typical packaged control system for a combination oil and gas fired boiler.—THE HAYS CORPORATION, Michigan City, Ind.

**W-18 PRIMARY WATER TREATMENT**—Folder, 6 pages—The importance of eliminating high solid rejection and damage to machinery from impure water is outlined, and primary industrial water treatment is explained.—HALL LABORATORIES, INC., Hagan Bldg., Pittsburgh 39, Pa.

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**W-19 CONCRETE FLOORS**—Booklet, 28 pages—Describes the company's absorption process method of heavy-duty concrete floor installation in a step-by-step pictorial sequence. Discusses materials selection to assure quality aggregate; gives examples of applications in factories, warehouses, and all types of industrial buildings—KALMAN FLOOR COMPANY, 110 East 42nd St., New York, N. Y.

**W-20 MOBILE CRANES**—Catalog, 8 pages—Gives tables of specifications for 4-ton, 8-ton, 12-ton, 17-ton, and 25-ton models. Photographs and line drawings show construction features, components, and industrial applications. Safety features are discussed—COLES CRANES, INC., P. O. Box 942, Joliet, Ill.

**W-21 GLOBE & ANGLE VALVES**—Bulletin No. 110—Presents a new line of bronze globe and angle valves, featuring seats and discs of cutlery grade, true "300 Brinell" stainless steel for leak-proof seal. Discusses advantages and construction features—THE KENNEDY VALVE MANUFACTURING CO., 1021 E. Water St., Elkhorn, N. Y.

**W-22 PULVERIZING PROCESS CONTROL**—Bulletin "Model B," 4 pages—Describes the new "Pulva-Sizer" for profitable production of pulverized materials. Explains design and construction, and gives recommended uses, chiefly in the process industries. Illustrated with photographs—PULVA CORPORATION, 556 High St., Perth Amboy, N. J.

**W-23 TOOLS OF AUTOMATION**—Booklet, 12 pages—Discusses adjustable speed drives as a tool of automation, and electronic controls and regulators that provide precise, accurate motor drive control and regulation. Photographs illustrate equipment and plant applications in various industries—RELIANCE ELECTRIC AND ENGINEERING CO., 1976 Ivanhoe Road, Cleveland 10, Ohio

**W-24 SUPERCHARGED COOLING**—Bulletin 62R8168, 8 pages—Progress report on three years' experience in supercharged internal conductor cooling of steam turbine generators. Explains use with 2600 rpm units and adaptability for 1800 rpm generators as well—ALLIS-CHALMERS MANUFACTURING COMPANY, P. O. Box 512, Milwaukee 1, Wis.



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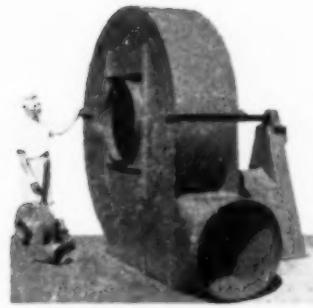
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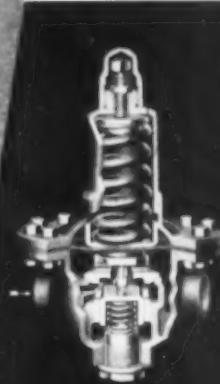


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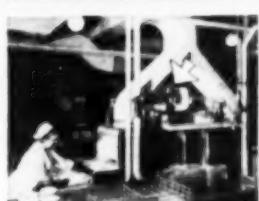
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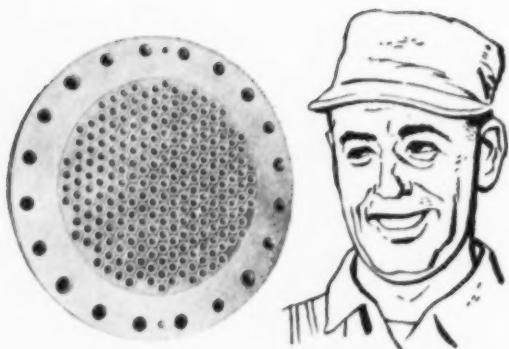
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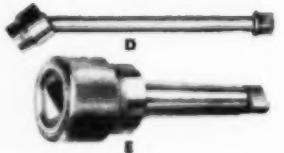
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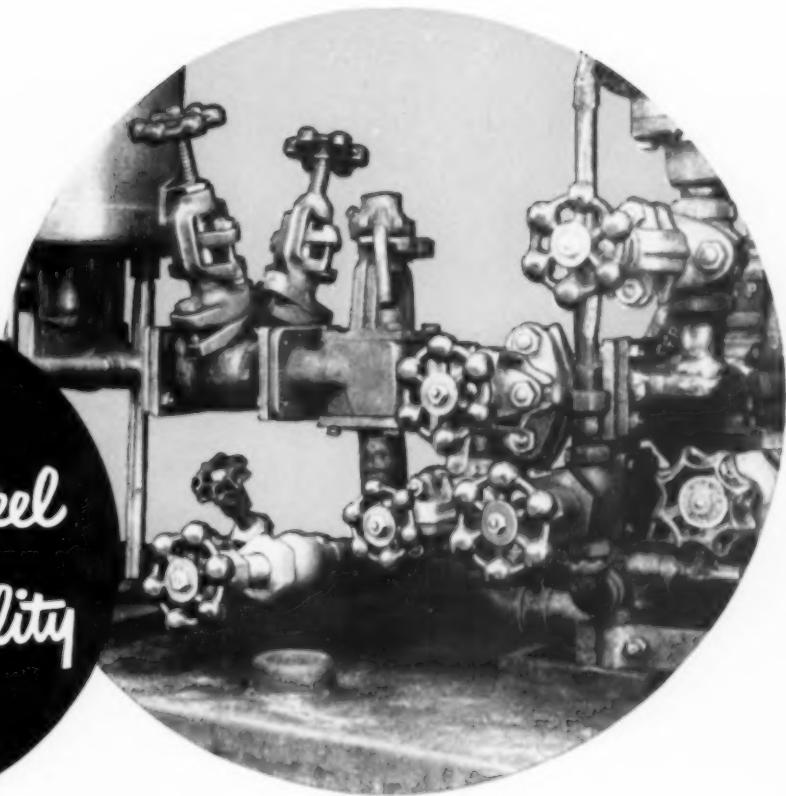
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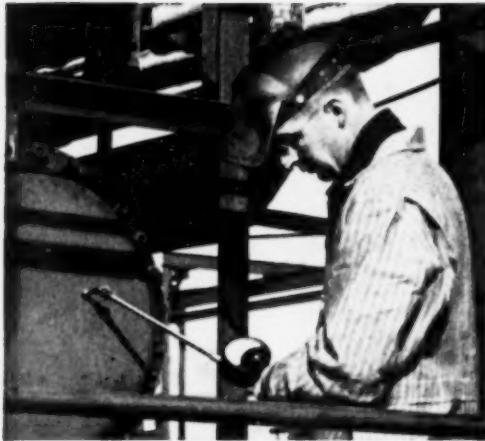
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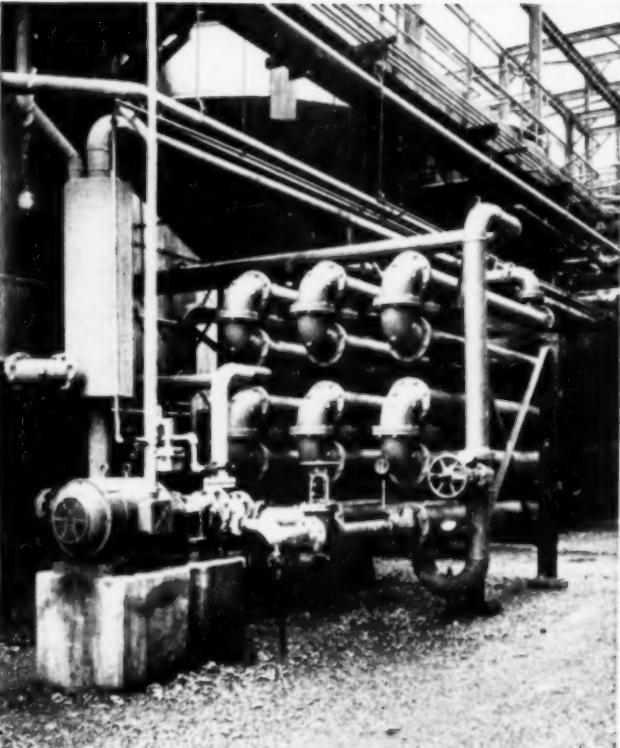


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